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VARIOLA AND INSANITY.

BY

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THE question of the interrelations of insanity and any acute disease naturally resolves itself into three factors. First, the influence of the acute disease in the production of insanity; second, the influence of the acute disease on co-existing insanity; third, the influence of co-existing insanity on the acute disease.

As illustrating the first two factors, numerous contributions are to be found in the literature, while to the third none have been made.

With regard to the first factor, Kräpelin[1] says, "whatever be part, real or ideal, regarded as being taken by the febrile state, the encephalic congestion, the specific poison, acting or not by decomposition of the albumen of the pustules, in the genesis of neurotic phenomena, it is most convenient to use clinical distinctions only in describing the psychical phenomena resulting from variola." He, therefore, describes the psychical manifestations as those of the febrile stage (the initial and suppurative period), and those of the terminal stage, the asthenic forms. The febrile type is a lypemania agitata with hallucinations; the psychical manifestations usually last less than a week; rarely more than a year. Of the cases examined by Kräpelin, fifty per cent lasted a week and less, sixteen and

[1] Archiv für Psychiatrie, Band xii., Heft 2.

seven-tenths per cent one month, the same number lasted a year, while sixteen and six-tenths per cent lasted more than a year. Ninety-one and seven-tenths per cent recovered; the remainder died or remained chronically insane.

The asthenic psychoses develop sometimes with the fall of temperature, between the eruptive and suppurative period; at other times during desquamation. The first are characterized by auditory and visual hallucinations and their consequences. This is claimed as a support for the theory of Emminghaus[1] that the psychical phenomena are due to toxæmia. Kräpelin says it would be more logical to suppose a direct action of the poison or germ on the nerve centres. This theory of the pathogeny is more applicable to the febrile psychical phenomena. The asthenic psychoses can, with more plausibility, be ascribed to acute exhaustion of the nerve centres succeeding to considerable thermic oscillations, and also consequent on central serous loss from peripheral pustulation. The psychical phenomena presented are those of an anxious lypemania, accompanied with hallucinations and sitophobia. They are of gradual evolution.

Seventeen per cent of the asthenic cases lasted one week; twenty-four per cent, one month; twenty-one per cent, one year; and thirty per cent, more than a year. Seventy-one per cent recovered, twenty-one per cent remained chronically insane, and eight per cent died. These types usually appear after a severe attack of variola.

Kipp[2] reports a case of transitory furor (*mania transitoria*) after variola. Stephanides[3] and Paulicki[4] in a general way confirm Kräpelin as to the existence of the

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[1] Archiv der Heilkunde, Band xiv., p. 348.
[2] Berliner Klinische Wochenschrift, Band xxxii., 1867, p. 333.
[3] Memorabilien, Band xiii.
[4] Psychiatrisches Centralblatt, Band v., p. 123.

psychoses mentioned. Frankel[1] reports a case of dementia seemingly resulting from encephalitis secondary to variola, and like cases are reported by Rostan,[2] Skae,[3] Hasse,[4] Gregory,[5] Wagner,[6] Westphal,[7] Lagardelle,[8] and Berti.[9] The two last mentioned, Luys,[10] Neustadt,[11] Fiedler,[12] Otto,[13] Zippe,[14] Thoré,[15] Maclagan,[16] Riva,[17] Guttstadt,[18] and Merriggi[19] report cases supporting Kräpelin. Variola, therefore, like the other exanthemata, produces three great types of insanity, agitated and anxious lypemania and dementia. It is by no means improbable that, like other forms of blood poisoning, it also produces varieties of acquired moral imbecility, the moral insanity of some authors.

Calastri,[20] Berti,[21] and Largardelle[22] have carefully studied the effects of variola on insanity. Sixty-one cases of this kind have come under notice. Fourteen recovered from insanity on recovering from variola, eight were improved, twenty-eight were unaffected, and eleven died.

Chatelain[23] reports thirteen cases in which insane patients were attacked by small-pox. A case of affective insanity

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[1] Irrenfreund, Band xvi., p. 78.
[2] Gazette des Hôpitaux, July, 1843.
[3] Journal of Mental Science, Vol. xxi.
[4], [5], [6] Cited by Kräpelin.
[7] Archiv für Psychiatrie, Band ii.
[8] Cited by Luys, Maladies mentales.
[9] Giornale Veneto di Scienze Mediche, Band xviii., No. 3.
[10] Maladies Mentales.
[11] Allg. Wien. Med. Centr. Zeitung, Band xi., p. 718.
[12] Allg. Zeitschrift für Psych., Band xxix., p. 718.
[13] Allg. Zeitschrift für Psych., Band xxix., p. 205.
[14] Allg. Zeitschrift für Psych., Band xxxiv., p. 335.
[15] Annales Med. Psych., April, 1856.
[16] Lancet, Dec. 2d, 1871.
[17] Annali Universali di Medic., February, 1873.
[18] Deutsche Klinik, Band xxiv.
[19] Rivista Clinica di Bologna, 1872.
[20] Archivio Italiano per la Malattie Nervoso, 1873–74.
[21] Giornale Veneto delle Scienze Mediche, toma xviii.
[22] La Variola et l'Alienation Mentale.
[23] Annales Médico-Psychologiques, 1872.

remained unaffected by a light attack of variola which was also the case with a placid dement. A querulous case of affective insanity, who suffered from a severe attack of variola, was unusually docile during the disease. A case of "chronic mania with delusions of suspicion" became worse during a light attack of variola. A case of affective insanity improved during the convalescence from a severe form of variola, but relapsed on recovery. Three "placid dements" were unaffected by a light attack of small-pox. Three cases of lypemania who suffered from a severe attack of variola improved during the febrile state, and one ultimately recovered.

Berthier reports[1] the case of a lypemaniac who recovered in consequence of, and after a severe attack of small-pox. Chiarugi[2] has had similar experience with a case of mania. Nasse[3] claims to have seen a case of paretic dementia cured by small-pox. Schläger[4] reports several cases in which variola occurring during insanity caused a cessation of psychical symptoms.

Merrigi[5] reports one case of epileptic insanity and two cases of chronical confusional insanity which improved after having been attacked by variola. He also cites two cases of chronic confusional insanity which recovered. Lombroso[6] reports a similar case.

In the wintry spring of 1875, small-pox made its appearance among the workhouse men employed about the New York City Asylum for the Insane. One patient, a case of confusional insanity, was attacked by it, and during the initial fever (the same in extent with that of a workhouse variolous patient who became delirious), became perfectly

[1] Ibid., 1846, i., p. 375.
[2] Cited by Marcé, Maladies Mentales.
[3] Irrenfreund, 1870, p. 113.
[4] Wiener Medizinische Zeitschrift, 1858, p. 151.
[5] Op. cit.
[6] Cited by Merrigi.

capable of carrying on a clear, coherent conversation. He was transferred to the Riverside Hospital, and during a three weeks' stay there was perfectly rational; he died from a complication. The influence of variola on insanity is beyond question. Now to what is this influence due? To the derivation produced by suppuration, or the direct influence of the variola on. the nerve centres? From the fact that other acute diseases (in which pustulation is not a feature) exert a like influence on insanity, I am of the opinion that it is due to the influence of the variola on the nerve centres themselves, or to the effects of the fever setting up secondary changes. To settle this question is, however, by no means a very easy matter. Calastri suggested as a means of determining whether the influence of variola on insanity was due to the variola or to the suppuration arising from it, that the insane should be vaccinated, and the effect on the course of the insanity studied.

Without any knowledge of his suggestion and in consequence of the epidemic to which allusion was made, Dr. M. J. Madigan[1] and myself[2] were led to vaccinate the patients of the New York City Asylum for the Insane. There are numerous delusions which render vaccination difficult, since the patients believe they could be poisoned by this means. One patient, indeed, evolved the curious delusion that his enemies had chosen this means of introducing spermatozoa into his system, and thus impregnating him.

Progressive paretics, atonic, simple and agitated lypemaniacs, primary monomaniacs with depressing delusions. terminal dements, and hebephreniacs were vaccinated, The phenomena therefrom resulting might be divided into four great classes: First, those in which the vaccinia exerted a beneficial effect upon the pre-existing insanity;

[1] Chicago Medical Review, July, 1882.
[2] Detroit Lancet, July, 1883.

second, those in which it unfavorably influenced this; third, those in which dangerous complications resulted; and finally, those exceptional cases in which dermic phenomena were present.

The psychoses on which vaccination exerted the most marked favorable influence were lypemania attonita and agitata, progressive paresis, rarely in acute lypemania, primary monomania, and chronic confusional insanity. In all cases wherein such influence was exerted, the vaccinasion was followed by a high fever and marked general constitutional disturbance.

Delusions of infection with syphilis, of loss of identity, of paralysis, of poisoning, and in several cases, of infection with small-pox, were frequently found after the vaccination. One case of a new delusion has already been mentioned. In progressive paretics certain trophic changes made their appearance. The toe nails in four cases dropped off. In one case othæmatoma made its appearance during the vaccinal fever. In a syphilitic progressive paretic the luetic affection seemed to take on a malignant type. Three atonic lypemaniacs who had markedly deficient capillary circulation, suffered from gangrene of the toes and fingers in consequence of vaccination. There were formed on a few progressive paretics large bullæ, which subsequently gave way to ulcers of a very indolent type. In two progressive paretics apoplectiform attacks came on during the vaccinal fever. In ten progressive paretics large abscesses made their appearance after the vaccinal fever had subsided, on the seat of the pre-existing vaccinal eruption. The hair of one progressive paretic became gray on one side of the head, while the eruption from vaccinia remained confined to the opposite side of the body. Two atonic lypemaniacs who were suffering from phthisis seemed to be disastrously influenced as regards the pulmonary affection which had been previously running its course

without marked febrile disturbance, but thereafter had marked rises in temperature. One lypemaniac became temporarily glycosuric. There was a pretty general eruption resembling variola. On the fever subsiding (in at least ten cases it reached 102° F.), the patient, if a lypemaniac, was found to be much more cheerful and occasionally delusions of persecution seemed to be temporarily in abeyance. One patient permanently recovered, and as he had exhibited no change previous to the vaccination, it is probable that this exerted a marked influence. The progressive paretics were attacked by boils soon after recovering from the vaccination, and were for a short time rational, but the physical symptoms of the disease remained unchanged. The agitated lypemaniacs were quiet and cheerful during the constitutional disturbance from the vaccination, but after it had passed away, all but two returned to their usual condition. These improved from that time, and finally recovered. Three primary monomaniacs were markedly quiet and relatively rational during the vaccinal fever. Four cases of chronic confusional insanity talked coherently and relevantly during the vaccinal fever, but resumed their usual condition on recovery.

It will be obvious from this that both the suppuration and the febrile condition exerted an influence in the production of improvement. Now comes the question whether vasomotor changes of a secondary nature are set up by variola. To this question the nature of the unfavorable influences set up by vaccination affords a most decided affirmative answer.

Whether any practical therapeutic hints can be derived from this effect of variola and vaccination is a matter of some doubt. Judging from somewhat rough analogies in ophthalmology, this would seem likely. The analogy is, however, far from being perfect. The ophthalmic procedures are intended to have a peculiarly local influence. In

psychiatry, an influence to be efficacious must have constitutional effects, and whether such constitutional effects are attainable is a matter requiring very careful experiment. One thing is against it: the *laisser aller* idea born of exaggerated non-restraint conceptions is too prevalent in the United States and England. The United States accepted the therapeutic apathy resulting from non-restraint, although it failed to accept the system itself. To attempt to benefit the insane by procedures in this direction, such as were attempted by Schroeder Van der Kolk, and lately by Meyer, is to raise a howl of philanthropic cant from the dilettante philanthropists who at present are much too dominant in the Anglo-Saxon countries.

The influence of insanity upon vaccination was far from clear, still a few cases existed in which such influence seemed to be traceable. These were chiefly in the direction of dermic phenomena. The dermic phenomena displayed during the existence of vaccinia were very varied. In some cases the eruption (which in at least forty-two was generalized) displayed a tendency to appear in patches of two or three pustules. In others there was a tendency of the eruption to follow the course of a nerve, and in a few cases the former places of vaccination exhibited pustules which began soon after, and ran about the same course as the pustules of vaccination.

Taking all these circumstances into consideration, it seems fair to conclude that: First, variola causes lypemania, dementia, and, probably, moral imbecility; second, that it exerts an influence, sometimes favorable, sometimes the reverse, on co-existing insanity; third, that the insanity may modify the variolous symptoms.

ON THE ALLEGED RELATION BETWEEN THE SPEECH DISTURBANCE AND THE TENDON REFLEX IN PARETIC DEMENTIA.[1]

BY

E. C. SPITZKA.

AT our annual meeting of eighteen hundred and eighty-one, Dr. J. C. Shaw, Medical Superintendent of the Kings County Lunatic Asylum, read a paper on the tendon-reflex in general paresis, which concluded with the following interesting and novel dicta:

"The exaggerated reflex is closely associated with two prominent symptoms in this disease. Those cases in which there are marked difficulties in speech, hesitancy, stuttering up to complete inability to speak (not aphasia proper), are the cases in which is always found, sooner or later, exaggerated tendon-reflex.

"And it is in those patients who have the marked difficulty in speech and the exaggerated tendon-reflex that we find almost invariably hemiparetic attacks, and comparatively rarely epileptiform attacks. There is, therefore, a direct connection between these difficulties in speech, the hemiparetic attacks, and the exaggerated tendon-reflex, and this is susceptible of pathological demonstration, and will be the subject of a communication from me at some future time."

Certainly, these suggestions, which seemed to open up a prospect of establishing a physiological relation between

[1] Read before the American Neurological Association, at its last session.

the speech centres and the lumbar enlargement of the spinal cord would merit our serious attention if the proposition that such a relation exists, were made but tentatively. It is stated, however, and very positively, that the direct relation between the disturbances in speech, the hemiparetic attacks, and the exaggerated tendon-reflex "is susceptible of pathological demonstration." And, indeed, the author cites a fair number of anatomical examinations (eighteen) made by himself in support of this assertion. It is before this association where the proposition originated that it merits discussion.

Unfortunately, the writer who makes the interesting proposition referred to has adopted premises in drawing his pathological conclusions which cannot but have tinged his results with a gross source of error. He has excluded altogether from consideration the pathological condition of the brain. He thus says: "Of these eighteen cases in which autopsies have been made, and the spinal cords examined, I shall give histories in the briefest manner possible, and shall make no attempt whatever to give a description of the histological changes in their cords at the present time, but speak of the lesions as they occupy regions of the cord, as my object is simply to connect, if possible, the alterations in this reflex with certain definite localized lesions, the absence of this reflex having been considered as a symptom almost as pathognomonic of locomotor ataxia, and its exaggeration as a distinctive symptom of spinal spastic paralysis and lateral amyotrophic sclerosis." Still further, the spinal cord is spoken of as "the part which alone will concern us for the present."

It so happens that in paretic dementia we have, as a rule, a diffuse affection of the entire central nervous axis. In some cases, the lesions seem to be concentrated and intensified in the cord; in others, in the cortex; and, as I have had occasion to observe in a series of fifteen au-

topsies, in not a small proportion in the brain-isthmus. A speech disturbance may be due to a high cerebral lesion, and may then be permanent, owing to irreparable degeneration of the cortex and subcortical tracts; it may, on the other hand, be evanescent, and due to temporary vasomotor crises; it may not differ in its mechanism, particularly when associated with hemiparetic attacks, from the speech disturbance following cerebral or meningeal hemorrhage. Speech disturbances may also, and as is my strong belief, frequently do depend on lesions in the oblongata. Here are a number of conditions which may in themselves be associated with changes in the tendon-reflex, but it was left to the writer cited to propose the one as a necessary adjunct of the other. Let us assume that, in a given case, there is lateral sclerosis, without gross disturbance of the speech centres and tracts, which is not only possible, but which undoubtedly occurs; would it be maintained that speech disturbance must be present, because the knee-jerk is increased? Suppose there were a transverse lesion high up in the cord (cases of which complication in paretic dementia are on record), would it be claimed that the condition of a reflex, cut off entirely, or nearly so, from the inhibitory influence of the higher centres, were indicative of the intrinsic condition of the latter? Suppose that the case were one of the kind first brought to the attention of the profession by Westphal, and of which we have had an example reported at this meeting, where symptoms of locomotor ataxia, including abolition of the tendon-reflex, had long preceded the development of paretic dementia proper, would not the one claiming a necessary relation between speech disturbance and tendon-reflex be nonplussed by the fact that the speech disturbance in such a case might be very great indeed, and yet not succeed in recalling to life its so-called associate, the tendon-reflex?

A brief reflection on these primitive considerations which must at once force themselves on the observant alienist, thus reveals the many obstacles which present themselves to the adoption of any theory which seeks in the reflex act of the patellar tendon, or in the lateral column, any portion, or accessory or related factor of the speech mechanism. The present writer had, however, concluded to await the further proof which was promised two years ago, feeling, as we, no doubt, all do, a lively interest in the establishment of new diagnostic and prognostic criteria in paretic dementia.

Our position with regard to the proposed theory is somewhat similar to that in which alienists found themselves when Dr. Austin announced that one pupil was more dilated in general paresis with melancholic delusions, and the other more dilated with the same disease when expansive delusions predominate. *A priori*, this view seemed fantastical enough, and the criticism was made by many that, physiologically incomprehensible as the relation seemed, it would require far more extensive figures to prove so startling a relation than those at Dr. Austin's disposal. Still Nasse and Pelman took the trouble to prove the incorrectness of Austin's assumption by the aid of statistics, and they have done psychiatry the service of burying one of the strangest errors in its history under a mass of unanswerable figures.

The proof in favor of such an attempted combination as that of the speech function and the functions of the spinal cord must be a hundred-fold more overwhelming than that required to establish the relation of a given cortical area to a cortical, or of a special spinal segment to a spinal function. In the latter cases, the observations, even if few, are satisfactory to scientists, because they harmonize with the presumptions of science. In the former case, the alleged relation would conflict with every pre-

sumption of science; or rather the presumption of science is that there are few things in neurology as remote from each other as the tendon-reflex and the speech function, unless it be the filum terminale and the olfactory bulb.

I have arranged in a table the last eighteen cases from my private practice, classified in such a way as to indicate the presence, degree, and character of the speech symptoms, the nature of the initial symptoms—an important factor omitted to be noted by the proponent of the new theory, and the condition of the tendon-reflex. In none was an autopsy made.

NO.	OCCUPATION; CAUSE IF KNOWN.	INITIAL SYMPTOMS.	SPEECH DISTURBANCE.	TENDON REFLEX.
1	Merchant, over-strain in business; and compelled to read late at night to an older and exacting relative.	Amnesia, and nervous exhaustion, fibrillary facial tremor, general lingual and manual tremor.	Marked stuttering and "Sylbenstolpern."	Slight, but distinct for the eight months of observation.
2	Wine-merchant, alcoholic excesses.	Apoplectiform seizures, vertigo, momentary lacunæ.	Hardly noticeable.	Much exaggerated.
3	Grocer, alcoholic excesses, syphilis, domestic trouble.	Fatuity, and querulous character change, lingual and manual tremor.	Not noticeable as such, disturbance in phonation.	Exaggerated
4	Various occupations, heredity, alcoholic and sexual exesses, worry and persecucution. (?)	Satyriasis, extravagant expenditures (earlier symptoms not known), marked tremor.	Not noticeable.	Exaggerated
5	Merchant, head injury followed by insolation, business worry.	Cephalalgia, congestive attacks, momentary amnesia, double consciousness, gross motor failure, evanescent of left side of body and face, involving eye muscles.	Thick, often incomprehensible.	Normal on right, exaggerated on left side.
6	Peddler, insolation, physical overstrain, sexual excesses.	Intense headache, irritability, diplopia, amnesia.	Amnesic and ataxic aphasia.	Normal.
7	Liquor-dealer, syphilis.	Fatuity, ataxia, diplopia, one epileptiform attack.	Momentarily absolute amnesia, at others typical speech disturbance.	Exaggerated

NO.	OCCUPATION; CAUSE IF KNOWN.	INITIAL SYMPTOMS.	SPEECH DISTURBANCE.	TENDON REFLEX.
8	Gentleman of leisure, heredity, syphilis.	Foolish behavior, quiet type of progressive dementia, no unusual amount of ataxia.	Speech disturbance very slight, explosive opening of sentences.	Exaggerated
9	Merchant, character always peculiar.	Change in affections to family, masturbation, unwillingness to rise from bed all day, hypochondriasis, personal vanity.	Not noticeable.	Slight.
10	Merchant and militia officer, paretic disposition, alcoholic excesses.	Sexual perversion, brutality, gradually progressing paraparesis, early inability to write well.	Not noticeable.	Exaggerated
11	Female, losses, care.	Errors in purchases, gradually progressing stupor and paresis with slight ataxia.	Patient opened sentences fairly, but broke down completely after fifteen minutes.	Abolished.
12	Fish-merchant, syphilis, alcoholic and sexual excesses.	Typical locomotor ataxia, then speech disturbance, hypochondriasis followed by hilarity.	Typical speech disturbance.	Abolished.
13	Merchant, syphilis, worry.	Syphilitic cerebral disorder, then hypochondriasis, succession of epileptiform attacks, followed by angry and hilarious excitement	No marked speech disturbance before epileptiform attacks, marked thereafter and disappearing.	Normal (throughout)
14	Lottery-agent, monomania of long standing, subsequently complicated by paretic dementia.	Irritability, querulous tendencies, hypochondriacal, persecutory and expansive ideas, evanescent motor weakness, no ataxia, characteristic pupillar and facial symptoms.	None.	Exaggerated
15	Canned-goods manufacturer, heredity, worry.	Impotence, bladder weakness, suspiciousness of relatives, violent outbreaks, persecutory delusions, intermingled with egotistical assertions.	None.	Normal.

NO.	OCCUPATION; CAUSE IF KNOWN.	INITIAL SYMPTOMS.	SPEECH DISTURBANCE.	TENDON REFLEX.
16	Mining-agent and owner, losses and worry.	Hypochondriacal ideas, depression of somatic functions, penuriousness, "snarl-like action" of facials, fibrillary lingual tremor.	None.	Normal.
17	Clergyman, labor and worry over transcendental problems.	Congestive seizures, insomnia, hypochondriasis, mask-like features, tremor of tongue and hands.	Slight thickness.	Exaggerated
18	Stenographer, unknown.	Drunken stagger, speech and appearance suddenly noted one day. Two years previous, complete amblyopia disappearing under iodide of potassium, then terrible cephalgia.	Marked and characteristic.	Normal.

SIMULATION OF INSANITY BY A CRIMINAL LUNATIC.

BY

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IT has been and is held by certain dilettante alienists that the claim of insanity made by a person under suspicion of having committed crime is the clearest evidence of sanity. Evidence to the contrary is to be found in the existence of cases which prove that not only are the in sane capable of feigning insanity for hypochondriacal reasons or for bizarre purposes, but that they do feign insanity to avoid punishment for crime. Delasiauve,[1] Ingels,[2] and Stark,[3] report cases where lunatics feigned insanity to escape punishment. Pelman[4] reports several such cases. Laehr[5] narrates the case of a person in whom there was marked hereditary taint, who committed a crime against morals, shammed a form of insanity which he had not, and his real insanity came out after the sham was exposed. Laurent[6] reports several imbeciles as feigning insanity.

Ray,[7] in his discussion of the case of Trimbur, says: "Men who have been much conversant with the insane

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[1] Journal de Médecine Mentale, 1868.
[2] Zeitschrift für Psychiatrie, 1870.
[3] Ibid., 1872.
[4] Irrenfreund, x., 1874.
[5] Archiv für Psych., Band I.
[6] Etude Médico-légale sur la Simulation.
[7] American Journal of Insanity, October, 1874.

in hospitals—not meaning those whose knowledge consists in having seen many thousand patients—need not be told that sometimes, for one purpose or another, they make a show of being more insane than they really are. Many of the insane do certain things as well as they ever did; they plan, contrive, anticipate in furtherance of a special purpose. The criminal classes to which most of these simulators belong know as well as any one else that the plea of insanity is one of the dodges whereby people now escape the punishment of their crimes, and they may not forget to act accordingly when they are insane. Trimbur being unconscious of his real insanity, but with mind enough to understand his situation, and to remember what he had heard about insanity in connection with crime, concluded to make a show of being crazy."

Dr. Hughes[1] has reported the case of a lunatic who committed murder, and feigned to be more insane than he was. In the first systematic article on this subject published in the United States, he says: "The insane appear at times, when they have an object to accomplish, more crazy than, and different from, what they really are; this is the sense in which we use the term simulation, and this condition is akin to that of feigning by the sane. Simulation, while it presupposes a degree of intelligence, does not require that the patient should be wholly sound in mind, and it might be attempted by a convalescent patient not thoroughly recovered, desirous of remaining longer in the hospital, or for some other cause" He reports the following case: R. S., aged twenty-five, married, had a history of domestic difficulties, masturbation, and three weeks' insanity before admission. Entered the Missouri State Lunatic Asylum in April, 1867, and was discharged recovered November of the same year. He had been a member of a variety show before becoming

[1] Alienist and Neurologist, July, 1883.

insane. Soon after the onset of his insanity, he had been seized with a sudden desire to preach, and, securing an audience in a country town, conducted the services with such an outrageous disregard of decency and propriety that he was driven from the pulpit. At the asylum to which he was sent soon after, he went through various insane performances, which were increased or diminished as there was evidence of lack of interest or the opposite among his auditors.

Dr. John P. Gray[1] cites the case of a man who, two or three days before being admitted, was met in the woods going towards his father's, carrying a gun, and said he was "going to shoot the old man." When admitted, he said "he had been out of his head for quite a while; should think twenty-four hours."

Dr. Workman[2] cites the case of an insane man who had escaped from his asylum, and killed his wife during an insane fit of jealousy; the man professed to the doctor to be completely amnesic while under trial for murder, denied that he had ever been under the doctor's charge, or that he knew anything about the asylum. The doctor stated to the jury that the man was both simulating insanity and was insane. The prisoner was acquitted, and sent to the Criminal Lunatic Asylum, at Kingston, Canada. The doctor saw him there two years subsequently. He then fully recognized the doctor, and, in answer to a question, said that "he did not *want* to know the doctor" when previously examined by him. Had he been sane, he would, as Dr. Workman suggests, have known that sufficient proof of his past insanity could have been produced, and he would have abstained from his clumsy simulation, or he would have acted more cleverly.

The Section on Mental Diseases of the International

[1] Utica Asylum Report, 1876.
[2] Cited by Hughes, op. cit.

Medical Congress of 1876[1] unanimously adopted the following conclusion: "It is not only not impossible for the insane to simulate insanity for any purpose, in any but its gravest forms of profound general mental involvement, but they actually do simulate acts and forms of insanity, for which there exists no pathological warrant that we can discover in the real disease affecting them."

Dr. E. C. Spitzka[2] cites a case in which a criminal lunatic, having all the signs of degeneracy mentioned by Morel, feigned a type of insanity with religious delusions.

Dr. Dagonet[3] reports a case in which a lunatic feigned insanity to secure admission to an insane asylum for an insane purpose.

Dr. Kiernan[4] reports the following cases: L. L., aged forty-eight, has had a brother and two uncles insane; was for a long time a pauper; is somewhat demented; has at times hallucinations of hearing; complains continually about having tar and grease in his head, and says he is insane in consequence. He says but little on these subjects except to the doctor, and for a long time refused to work as being insane, and having tar and grease in his head. He has found that his statement of being insane and having tar and grease in his head draw attention of visitors toward him, and lead to his receiving tobacco; he is therefore markedly obtrusive with these statements when in presence of visitors. He denies that he has hallucinations, and these can be drawn from him only after prolonged questioning. The patient's skull is asymmetrical, and he is one of the cases hovering between primäre verrücktheit of the Germans, imbecility and terminal dementia. The contrast between his conceal-

[1] Transactions of the Congress, p. 20.
[2] Journal of Nervous and Mental Diseases, 1877.
[3] Journal de Médecine Mentale, 1868.
[4] Alienist and Neurologist, April, 1882.

ment of his real insanity and the obtrusive manner in which he manifests his assumed delusions is very marked.

The second case was a hebephreniac (the pubescent insanity of Skae; the primary dementia of some asylum reports; one of the varieties of insanity of masturbation), who displayed all the conceit and ideas of self-importance found in that psychosis, but who found that a monomaniac attracted much more attention than he did, simply because the latter claimed to have written several of Shakespeare's tragedies; whereupon he claimed to have written "all of Byron, all of Shelley, and all of Milton." A simple cross-examination showed this claim to be a feigned one, and this patient not infrequently so admitted to the physician, but kept up making the claim to visitors, although he refrained from so doing to the physicians themselves. The third case was a man, chronic secondary maniac, who plunged every morning into the river for a bath, breaking the ice, if necessary, to secure it. This man found that by feigning dementia he was able to secure tobacco and other little comforts. Kiernan concludes that: 1st. The insane can, and do, feign insanity for a purpose. 2d. That the types of insanity so doing are, as a rule, those in which there is a strong hereditary taint There may be a slight degree of dementia, but this cannot be extreme. 3d. The type of insanity most likely to simulate insanity is the primäre Verrücktheit of the German, the manie raisonnante of the French, the imbecility of the first grade of Ray and Nichols, the monomania of Spitzka, the chronic intellectual mania, or chronic mania without incoherence of asylum reports. 4th. The insane may feign insanity when accused of crime, and a new complication thereby enters into the question of diagnosis. It may be of interest here to note that Dr. Ray's theory that Hamlet was an insane man feigning insanity will

better explain the psychological problem presented in this play than any theory yet suggested.

Dr. Nichols,[1] of Bloomingdale Asylum, New York, at the conference of experts on the Guiteau case, cited the case of a man who committed murder under, as he believed, the command of the Virgin Mary, who appeared to him in the flame of a candle. Two young lawyers were assigned as his counsel; they advised him to feign insanity, which he did, under the form of dementia. The experts, Drs. Nichols and Ranney, detected both the sham and the real insanity, and had him sent to an asylum, where his insanity became unmistakable.

Morandon de Monteyel[2] reports the case of a woman charged with murder who feigned insanity to escape the consequences.

Spitzka[3] states that Dubourque, the Fourteenth street New York woman stabber, feigned forgetfulness of his crime. Dewey[4] sates that the insane feign insanity for a purpose.

A case of a lunatic feigning insanity came under my observation under the following circumstances.

June 20th, 1882, I examined J. P., a hebephreniac then imprisoned for disorderly conduct, who was quiet and seemingly harmless, and sent him back to the Bridewell to await trial for insanity, the law of the State requiring all the insane to be tried before committal to an hospital for the insane. He was placed in the same cell with C., who, when put in the cell, was drunk and ugly. The crowded condition of the Bridewell required two men to sleep in a bed, two feet wide and eight feet long. C.'s condition naturally inspired him with a notion that he

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[1] American Journal of Neurology and Psychiatry, February, 1882.
[2] L'Encéphale, No. 1, 1882.
[3] Insanity.—Its Classification, Diagnosis, and Treatment.
[4] American Journal of Insanity, July, 1882.

was entitled to most of the bed. The result was a quarrel, in which P. was too weak to take an active part (C. was a burly fellow, six feet high); so he nourished his resentment until his bed-fellow was asleep, and then sated his spite with the other's blood.

One of C.'s legs was cut off, some years ago, in a railroad accident. He wore instead a wooden stump, heavily shod at the bottom with iron, and attached to a sort of splint, which ran up to the thigh. This splint made a convenient handle for the murderer, and the iron ferule at the bottom gave the weapon frightful efficacy.

P. had arisen stealthily in the night, and with the wooden leg's iron end struck C. on the head, which produced unconsciousness. Following this up, he made the murder a work of barbarous mutilation.

L., a deputy-turnkey, was the first to learn of the murder. It is one of L.'s duties to marshal the men from their cells to breakfast in the morning. At six o'clock in the morning, when he came to the cell occupied by P. and C., he encountered P. in the door, who told him that there was no occasion for inspecting the cell, as everything was all right. At this show of insubordination, L. called the turnkey, who dragged P. into the corridor. L. meanwhile entered the cell and found C. lying on the narrow prison bed as if asleep. Closer inspection, however, showed that the sleep was the sleep of death. The skull was battered open, the eye was completely obliterated, and the brain protruded from a gap large enough to admit a fist.

When the stump was seen, it had recently been cleaned off with a rag. In a bucket were hidden blood-soiled bedclothes.

P. was immediately taken into the cell adjoining and again locked up. To all questions as to his motive for the killing he replied at first with mere looks, utterly vacuous and demented. Subsequently, he denied that he

had killed any one, or that he had even seen a dead man. As to the blood which disfigured his hands and face, he said that his nose had bled during the night.

He was a tall, slim boy, twenty years old, pale-faced and light-haired. His face had the aimless expression of a dolt, except for an occasional gleam of cunning, which furnished ground for the belief that he was not so insane as he looked. Insane he was certainly, but the story of the bleeding nose and the unwillingness to talk were evidence that the boy had at least a partial conception of the enormity of his crime and of the expediency of feigning insanity. That he was insane and feigning insanity was clearly evident to even the newspaper reporters and to the jury who subsequently tried and found him insane.

It will be readily seen that this case has two features of great medico-legal importance. First, it shows that, as has been claimed by Kiernan,[1] motive is not an absolute, or even a valuable test of sanity; second, that a lunatic is capable of committing a crime for revenge, and of feigning insane to escape the consequences of the same.

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[1] AMERICAN JOURNAL OF NEUROLOGY AND PSYCHIATRY, February, 1883.

THE SOMATIC ETIOLOGY OF CRIME.

BY

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ARTICLE II.

MY reasons for writing a second article on the etiology of crime is to treat more particularly upon a subject which is now, as it always has done, attracting the attention of the thinking portion of society; because, although not itself crime, it certainly is a great source of crime; perhaps it may partly be considered as great a source of crime as is pauperism. I allude to what writers in the present day call the great social evil, which the Catholic Church calls sins of impurity, inchastity, which the world recognizes by the term prostitution.

In this article, I shall consider the subject of mind-reading; for although the two subjects have no direct bearing one upon the other, yet by understanding what is mind-reading, we will the better understand the etiology of our great social evil.

All phenomena which are made manifest to us must have a physical cause; therefore every phenomenon has its etiology, cause for effect. The following I cite from the *Montreal Gazette* for June 21st, 1883, under the heading, "A Marvellous Performance:"

"The ladies and gentlemen who assembled in the parlors of the Windsor Hotal last night, in response to the invitation of Mr. Stuart Cumberland, were prepared for something wonderful in the way of mind-reading, but it is doubtful whether any one who had not already seen Mr. Cumberland's marvellous power was prepared for the extraordinary exhibition given by that gentleman. The gathering included a number of well-known ladies and gentlemen, amongst the latter being the Rev. Canon Ellegood, J. Lowe, and J. Ker, of Quebec; Col. Stevenson, Mr. Thomas White, M.P., Mr. James Stevenson, General Passenger Agent on the Grand Trunk Railway; Mr. H. J. Shaw, Mr. Richard White, Mr. Archer Baker, Mr. E. G. O'Connor, and a number of others. Mr. Cumberland, with the object of finding a suitable subject, experimented with several gentlemen with success in every case, the chief of these preliminary trials being the discovery of a letter in the pocket of the Rev. Mr. Ker, thought of by the Rev. Mr. Lowe. Mr. Thomas White, M.P., was then chosen by the company as the one who should think of an object within a quarter of a mile of the hotel, to be found and brought by Mr. Cumberland, who then left the room to don his overcoat. Mr. White, having thought of the object, wrote it down on a piece of paper, which he handed to Mr. Stephenson, who placed it unread, and with its contents of course entirely unknown to any one present, in his pocket. Mr. Cumberland, having returned to the room, asked that a committee be named, which was done, amongst those chosen being two of the clergymen. He then bound himself to Mr. White by a piece of wire wound round the wrist of each with a space of a foot or two between, and was finally blindfolded. The two then started, followed by the committee and a number of others. Down the hotel stairs, out through the main entrance, they went into the street. Towards and across Dor-

chester street the mind-reader lead the M.P., and down to the front of the Rev. Canon Carmichael's residence. Pausing for a moment, they continued their career, ascending the steps to St. George's Church, at each door of which a brief halt occurred. Then Mr. Cumberland led Mr. White across the grass plots, through the shrubberies, to the door of the parsonage, entered, and went up-stairs to a study on the second flat; descending again, he at once went into a down-stairs study, where was seated the Rev. Canon Carmichael, who must have been surprised at the sudden appearance and the apparent strangeness of the whole proceeding, crossed over to a table on which stood a microscope, took from the instrument its cloth cover, and at once said that was what Mr. White had thought of. Mr. White acknowledged the correctness of the discovery, and the party returned to the hotel, where Mr. Stevenson opened the paper, and found written thereon, 'The cloth cover of the microscope in Mr. Carmichael's study.' The marvellous nature of the feat accomplished by Mr. Cumberland sufficiently impressed every one present, and they bade adieu to the mind-reader, more than ever mystified by his wonderful powers. Mr. Cumberland appears to-night and to-morrow night in the Queen's Hall, and will repeat the feat he did last night with another subject."

On the evening of the 22d of June, I went to hear and see the marvellous performance of Mr. Cumberland, and from what I saw, I pronounce the above as a true description of his performance. He, that evening when I saw him, read the number of a bank note in the possession of one of the audience, the number being known to the gentleman to whom he was attached by the wire cord. Before going that evening to see Mr. Cumberland, I had already made up my mind as to what the phenomenon was or how it was to be accounted for, and had written the

following. I found my views confirmed by what I saw. I was struck with the manner in which he read the figures on the note. He had a sheet of paper placed before him; he being blindfolded, then said to the gentleman to whom he was united by a wire cord: Fix your eyes on that paper and then see the first figure of the number on the note, to the exclusion of all other numbers; let that one number only occupy your mind; while you are doing so I will draw that figure upon the paper; so will you act with all the different figures. Mr. Cumberland was successful, and, as I have already said, I found my views of mind, reading confirmed.

Written after reading the report in the *Gazette*. Mr. Cumberland covers his eyes with a handkerchief. With what object? I presume his object was that nothing visible may attract his mind from the mind of Mr. White; in fact, he takes all the precaution he can, as far as will goes, to render his own mental organization a vacuum that his mental organization may be the better impressed with the mind of Mr. White.

Mr. Cumberland choses from his audience, or from those of the audience that offer themselves, the man of strongest will-power to experiment with, for it requires a man of strong will-power to keep his mind steadfastly concentrated; therefore he chose Mr. White to keep his mind steadfastly fixed upon the words he had written upon the piece of paper, which was then in the pocket of Mr. Stephens. Now, what followed? Mind is a phenomenon of matter; in other words, mind manifests itself through matter, and for every thought of man, whether expressed or not, that is, whether they be spoken or unspoken words, there is a loss of force, that is, there is force discharged from matter from the mental organization of the person thinking. It may be due to *molecular* or physical change of matter, or *atomic* or chemical change of

matter, or to both. By the term molecules physical scientists mean the ultimate products of the physical division of matter, and by atoms the ultimate products of the chemical decomposition of matter. In virtue of the laws of waste and supply, animal organisms are always undergoing change. Therefore, when a man thinks, there is discharge of mental force, just as if a man speaks.

Now, Mr. White, being a man of strong will, concentrated his mind on one subject, one idea occupied his whole mental organization, as far as it was possible for him to do so by his will; consequently, there was all that time as constant a discharge of physical force from the mental organization of Mr. White as if he had been making known his thoughts by spoken, instead of unspoken, words. That is, chemical decomposition was going on, and molecular motion.

Now, in the case of Mr. White, into whom or what did his thinking physical force discharge itself? For it must go somewhere, as force, like with matter, cannot be lost. Of course, into the matter it was nearest connected with, and most suitable to receive it—by Mr. Cumberland—that was, by the conducting wire connected to Mr. White; that is to say, Mr. Cumberland was the recipient of Mr. White's thoughts conveyed to him in unspoken words by the discharge of Mr. White's physical force and the concentrated power of his will, through their telegraph mediums, the peripheral of the sensory nerves, these nerves being the medium of communication between all forces from without to the nerve centres in the recipient.

If Mr. White was not a man of strong will, by which will he could, for the time being, keep his thoughts fixed on the one subject, he would not be a good subject for Mr. Cumberland to experiment with.

It may be asked, why should not Mr. White's physical force be discharged elsewhere as well as into Mr. Cum-

berland? Because Mr. Cumberland was attached to Mr. White by a conducting medium, the wire cord, which brought the force in immediate contact with these telegraph lines, the sensory nerves. Secondly, Mr. White willed his nerve force to Mr. Cumberland. Thirdly, by the natural law of affinity. Nature's physical forces passing from one concrete is received by another concrete more rapidly than by inorganic matter. There is a very great affinity between animal organisms and their forces.

No doubt but that to a professor like Mr. Cumberland the connecting wire between him and Mr. White is of great advantage, but I don't consider it actually necessary for mind-reading, for atmospheric air is, as a rule, a great conductor of natural physical forces. Mind-reading is not so very uncommon as is generally supposed. Every day men and women read each other's minds very accurately without spoken words, sometimes for good, very frequently for evil, and their minds, again, are very frequently read by observers.

The lesson that I have learned from Mr. Cumberland's mind-reading is a strong confirmation of those natural laws already so well-established that all phenomena are natural phenomena, capable of being explained by physical science, when that science is well-understood, that mind is a phenomenon of matter, and can, under certain circumstances, be communicated from one person to another without spoken words, or without the use of sight, and this accounts for very many unexplained mysteries which rendered our forefathers, some happy and some unhappy, because they were ignorant of nature's laws.

That nature is one great whole of which man and all organic and inorganic matter forms a part, that some of nature's forces within us are controllable by will force, and that others are not always controllable, and that, as nature's forces are always in motion, man's internal forces

are frequently overcome by external or outside natural forces, rendering him, under such circumstances, irresponsible for his acts, and thus can we more particularly account for crimes that are otherwise unaccountable.

This brings me to the second part of my subject, and the careful reader will see that the first part is, in a great degree, a good introduction to the second. The tendency of the present day is a belief in acts of parliament, and for the civil power to extend that power as much as possible, so as to add to our already too extensive criminal code that which heretore had not been recognized as crime. In fact, the tendency is to no longer draw a line between sin which is wilful offence against God, and crime which is offence against whatever may happen at the time to be the established order of things.

Under the Mosaic dispensation, adultery was not only a sin, but a crime, at least so far as the woman was concerned, punishable by the death of the offender.

It does not appear why Moses exempted the man from blame and had the woman stoned to death. Perhaps, then, as now, chastity was considered the crowning virtue of a woman, as courage then, as now, was considered the crowning virtue of a man, and then, as now, it was never taken into consideration that chastity and courage were the outcome of our physical organization.

Under the Christian dispensation, all inchastity came under the category of sin. Christ settled the question in the case of the woman brought before him in the ever memorable words: "Let him that is without *sin* cast the first stone," . . . "go and *sin* no more."

Now, for eighteen hundred years this latter has been the teaching of the Catholic Church; she has also taught that inchastity was immoral, because it produced evil results, and anything that causes evil is immoral, as all which leads to the good of ourselves and others is of the

moral order. That which leads to the social good of all is *right* and moral; that which leads to social evil is wrong and immoral. Now inchastity is a social evil, and, like unto other social evils, is of itself immoral.

But the Catholic Church, without making any exception, has declared all men sinners, and that *none* could be saved, except as pardoned sinners. But the Church, while declaring all men sinners, did not by any means declare all men criminals; thus did she draw the distinction between sin and crime. The Church has always recognized that there are crimes that are sinful in their character, murder, for example, and that there are sins that have not the characteristics of crime, for example, the sin of covetousness. If men would only learn what the true position of the Catholic Church is, what she herself claims to be, we would not hear so much nonsense as appears daily in the press, asking such absurd questions, "why don't the Pope do this, and why don't the Bishops do that, why don't they prevent their people from committing crime?" Now, this sounds very well and would be all very good if the Catholic Church had declared that her mission was to prevent crime, but she never said anything of the sort, nor has she undertaken to do anything of the sort. She does not even pretend to prevent or abolish sin. What, then, are the pretensions of the Catholic Church? She declares that she is infallible where she pronounces questions regarding *faith* and *morals*, and that she has the power of pardoning penitent sinners, that is, to absolve them from the eternal punishment due to their sins. She has never ceased to protest against sin, and warn sinners, and call upon them to repent and confess their sins, and has never refused to absolve the penitent sinner, no matter how grievous may have been his sins.

How absurd and illogical then are those persons who always are attacking the Catholic Church and Christianity

itself, asking, "why has not the Church and Christianity been able to have Christians, at least, to live without either sin or crime?" not considering that neither Christ himself nor the Catholic Church ever even hinted that such should be the case.

Now, no one can deny but that adultery and fornication, which, as far as we know, has always existed, and never more than in the present day, has been, and is, a great social evil, if for no other reason than that it has been, and is, one of the greatest sources of the most terrible crimes in all classes of society. No doubt but that it has brought more suffering, sorrow, and injustice into the world than even pauperism, and, therefore, inchastity is immorality.

Now, what is its etiology? For where there is effect, there must be cause, and this particular sin at least must have an etiology.

All writers who have written upon this subject, as far as I am aware of, have written from one of two stand-points, either that inchastity was the result of a natural law, and only an evil because society made it so, or that it was an actual evil, but an evil for which each individual who committed it should be held personally responsible, because all could avoid it if they would.

Those of the first part defend their views upon the well-known and well-established natural law, that of the reproduction of species, forgetting that the object of the majority is not reproduction of species, but the gratification of sexual desire.

Those of the second part defend their thesis on the theological grounds of man's free will and his capacity of self-control.

In answer to the latter I would say, will is a natural physical force, not by any means equal in all, and experience gives us the most positive proofs that man is not what he *would* be, but what his physical organization

makes him. He is responsible for what he *can* do, not for what he may wish to do. "What is the peculiarity of our nature in contrast with the inferior animals around us? It is that, though *man cannot change what he is born with*, he is a being of progress with relation to his perfection and characteristic good. Other beings are complete from their first existence in that line of excellence which is allotted to them, but man begins with nothing realized (to use the word), and he has to make capital for himself by the exercise of those faculties which are his natural inheritance." (Cardinal Newman, Grammar of Assent.)

Yes, the brute is perfect for the brute; therefore to the brute, in this respect, may we look to discover natural laws, and what do we find? We find that the male and female brutes never seek each other except for the reproduction of species, and it is so with all other organisms, whether animal or vegetable, save and except man. They seek each other for the gratification of sexual desire; and why? Because man has not yet arrived at that degree of perfection for which nature means him. Man has not yet fully developed as an organism; if he had, he could have no desire that would not be under the control of his will, all desires would be normal, more particularly would sexual desire be absorbed into the simple desire of the reproduction of species. It is a natural law that the higher the organism the longer it takes to develop, to arrive at perfection; thus do we account for the difference between brutes and man in their order of excellence. Therefore the strong sexual, and in the large majority of cases, uncontrollable desire in man is not the result of a natural law, but of his imperfect organization. I speak of both male and female, in making use of the term man.

At a certain period of man's life a great physical change takes place in the reproductive organs, producing an entire change in their whole organism, calling forth, by

reflex action, feelings and desires that never existed before, desires never dreamt of previously, more particularly sexual desire. This physical change changes the whole man, male and female. Whether this desire becomes an uncontrollable, inchaste passion, leading to the great social evil of which I am writing, or not, or whether it leads to sickness, insanity or death, will altogether depend, *not* upon the will of the person, but the strength of the will, and the strength of other organisms. Under these circumstances, what an absurdity it is to talk of acts of parliament and law for the suppression of our great social evil, an evil the outcome of an imperfect physical organization. Man began his existence as we, his descendants, have done, from a single cell, the only difference being between then and now that the first took millions of years before the cell developed into the man, now it only takes a few months. By the law of reproduction of species, some consider that man is as perfect an organism now as he ever will be. I see no reason, judging from the past, why man should not, in time, develop to a more perfect state, at least to as high a state for man as brute has for brute, that is, till he has an equally balanced organization, till all his organisms work in harmony; in other words, till he is one harmonious whole.

Art cannot destroy or resist nature's laws, but it can make use of nature's laws, and assist nature in perfecting her work, and man, in virtue of what intelligences he possesses, is doing this every day. Very true that man has made many blunders, many mistakes, but only when he has gone contrary to nature's laws; and then man has always suffered the consequence of his ignorance or wilfulness, and has had to retrace his steps and begin anew. Man made a great mistake when he created a pauper class of society, but not greater than when he created an idle class—idle aristocratic class—for idleness is not only

contrary to all nature's laws, but a curse to society. Every man should take a man's place and do a man's work in society. Nature has made divisions of labor that all may find suitable employment.

The cause, then, of our great social evil is man's imperfect organization. Some are more susceptible than others, and more easily impressed from external forces, and this because of their peculiar temperament, which temperament is the outcome of their diathesis, that is of their physiology.

> "'Tis easy to cry 'Raca' from within
> Cold, passionless morality's strong tower,
> To those who struggle fiercely hour by hour,
> 'Gainst grim Goliaths of unconquered sin."—JOHN READE.

In pointing out that this social evil has a somatic etiology, I would not be understood to say that society should fold its arms and remain idle, without some effort to arrest the evil. But I do say that taking it out of the category of sin and making it a crime is not only unjustifiable, but a grievous blunder; as unjustifiable as to make cowardice a crime. Publicity, the result of making it a crime, only tends to the increase of the evil, for it is a fact that very many are led astray simply by curiosity, and publicity rouses curiosity. Much better for the sake of society, as well as for the parties concerned, to take the advice of "My Uncle Toby, to cover it up and say nothing about it." Such a course would do more towards mitigating the evil than all the law courts and prisons in the world; or than all the expressed horrors of society. Something then that we should not do is to break the natural law of charity, that of "doing to others as we would be done by," for we can break none of nature's laws and not produce evils nor be guilty of immorality.

What more can be done? Let us always keep in view what is the etiology of this social evil, and give our best

efforts towards assisting nature in improving man's physical organization. Let parents and children avoid alcohol, in every shape and form. Let our whole social system be changed, a system which turns night into day. Let there be no idleness, yet no slavery, but moderation in all things. Let there be no sentimentalism, but stern reality. Let children be educated with a view to their health, and learn nature's laws from nature, leaving book-learning till their physical organization is well developed. When the boy and girl arrive at the age of puberty, let there be no false sentiment, leaving them to find out themselves the meaning of the change that has taken place in their organization, and consequently in their feelings and desires. But let them be instructed as to the cause of these changes, and have timely warning to use their best efforts to bring their newly formed desires under the control of their wills, and this, because it is right they should do so, not only for the sake of society, but for their own sakes, that they may grow up strong in body and mind, the man fit to take a man's place, and do a man's work in the world; the woman fit to take a woman's place, and do a woman's work in the world. What we want is a social revolution.

If society will only act thus, only do its part, nature is sure to do her part well, and, in time, man will be a more perfect organized animal, his mental organization will be better balanced, and so will this social evil disappear, with many other social evils. We learn from the mind-reader that man can communicate his thoughts to man, independent of spoken words. So it is that nature and nature's God speaks to us, filling our organism with thoughts that we are never capable of entirely giving expression to. So we learn of nature, not only by hearing, seeing, and feeling, but by a thousand different other modes, because we are part of nature herself, and in all her modes of communicating with us, she calls upon us to learn of her and live

in obedience to her laws. Nature and God meant us to be good and happy, and not miserable and immoral; but we have rendered ourselves miserable and unhappy by living in the breach of nature's God's laws.

As I have heretofore maintained that punishment is not a remedy for crime, so do I maintain it is not a remedy for sin. More particularly is it not a remedy for our great social evil. But while I protest against punishment, I do not say that there should not be such police regulations as would prevent open scandals and public indecencies.

It may be asked why, as an alienist, I take such an interest in the criminal class of society. I answer, because it is an alienist's duty, from the relation of crime to mental diseases; so I maintain it is impossible for the physical scientist—and no other can be a true alienist—to treat of insanity without treating of crime. I take interest in the criminal class of society, not because I admire the criminal or approve of crime, but because I don't believe we should have a criminal class of society at all, and that the best way to be rid of such a class is to learn and know it has a somatic etiology. If we would destroy a great social evil, our first duty is to discover the cause, and remove it. Any treatment of the consequences without removing the cause will only prove, as it has always done, labor in vain.

If man were a perfectly organized being, his physical forces would balance each other, and one organism would not destroy another, neither would any external physical force be able to control that natural force—man's will—without destroying him altogether.

It is impossible to comprehend why some men possess such powerful influence over some women, and some women over some men, except by recognizing that there is weak will force on one side and strong will force on the other, and that in both sides there is an imperfectly bal-

anced mental organization. Sexual desire alone cannot explain this phenomenon, for those who wield the influence and those who yield to it are very frequently those who could gratify their desires without either sin, or shame, or offending society.

We see men and women, with their eyes wide open to the consequences, knowing well that they are rushing to ruin and disgrace, and nothing will arrest them in their course. They even know that they are breaking nature's first law—the law of self-preservation—yet on they go to self-destruction. Now it is impossible that people could act such fools except they were imperfectly organized. I know all that can be said on the subject of our sinful natures, but then we know that whatever our nature may be, whether good or bad, moral or immoral, our nature or temperament is the outcome of our physical organization, which governs our conduct, and this society —that argus-eyed god of the pagans—who knows everything, and finds out every one's most hidden secret, should learn, if they would see such a social revolution as the cessation of inchastity which has proved itself to be such a great social evil.

RESEARCHES IN THE NORMAL AND PATHOLOGICAL ANATOMY OF THE GRAY SUBSTANCE OF THE BRAIN, WITH REMARKS ON METHODS OF EXAMINATION.

BY

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A. *General Remarks on the Distribution and Character of the Gray Substance.*

GRAY substance is found chiefly in the cortices of the cerebral hemispheres and the cerebellum, in the thalamus, corpus striatum, lentiform nucleus, claustrum and amygdalæform nucleus; it is also distributed at the floor of the fourth ventricle (*stratum cinereum sinus rhomboidei*) in the nuclei of Deiters, the upper and lower olives, the pyramidal and post-pyramidal nuclei (of which the latter does not fall within the brain proper), and in the middle commissure (*commissura media s. mollis*). The parts here enumerated are almost exclusively composed of gray substance. Gray substance is also found, but in lesser predominance, in the pes hippocampi, major and minor, the eminentia collateralis Meckelii, tuber cinereum, infundibulum, fascia dentata, corpus dentatum, vermis cerebelli, lingula, corpora quadrigemina, nucleus fastigii (Dachkern of Stilling), pons Varolii, the epiphysis and hypophysis, lamina cribrosa posterior, and the tegmentum pedunculi.

The physical character of gray substance, such as, for

example, its color, depends, aside from its purity from admixture of other substances, on its richness in blood-vessels and the number and pigmentation of its ganglionic bodies and other cellular elements. It may be also surmised that the proportion of lecithin, albumen, and water has some influence in this direction, for it is well known that in these ingredients the gray substance is richer than the white. Its relative poverty in cholesterin and bodies ordinarily, but erroneously, designated as fats, may also be of significance with regard to the physical properties of gray matter; but the more extended discussion of these features may be with propriety left to physiological chemistry.

1. *The Vascular and Peri-vascular Spaces.*

Since the space known as the space of Virchow-Robin has been named after its discoverers, scarcely any valuable contribution has been made regarding its nature. Indeed, what has been done, particularly since the publication of His' experiments down to the most recent times,[1] is calculated to confuse rather than to enlighten us. It is high time to make at least an attempt to clear up the doubts and confusion prevailing on this head.

Let us see what the discoverers of this space—which I will purposely avoid naming—say in clear and unmistakable language, premising the citation with a brief history of the preliminary observations which led to their discovery.

Already in 1846, Hasse and Kölliker (1) described vesicular and sacculated partial dilatations on brain vessels, in a case of limited red softening, which they regarded as capillaries. Bruch (2) doubted the capillary nature of the alteration, and Henle (3) believed that the observation of the two former observers related to veins. Kölliker sub-

[1] The manuscript of this paper was completed in 1876, and is published without alteration here; the numerous other duties of the writer having interfered with the further prosecution of his researches.

sequently admitted that only a portion of the described vessels were capillaries—and these of the coarser variety—while most were in reality veins. He, soon after, studied a number of similar cases, and called attention to peculiar spurious aneurisms of the smallest brain-arterioles which consisted in an extravasation of blood between their middle tunic and adventitia. As far as I can find, Kölliker nowhere states whether they arise by rupture of the middle or of the internal coat; but Virchow maintains that they are produced *per rexim.* Kölliker nowhere says anything suggesting an inflammatory character of the appearance described. His description corresponds to what I have artificially produced in a number of rabbits, as a pathological dilatation of the space of Virchow-Robin, by ligating both subclavian or jugular veins. That Kölliker did not regard these objects as ordinary spurious aneurisms is apparent from the fact that he speaks of them as "*eigenthümlich*," and that he did not discover any evidences of inflammation or other vascular change in them. Virchow (4), in 1851, described a species of old aneurism in which there was discoverable, under the microscope, a finely-granular, strongly-refractive substance, which was contained partly in the canal and *in other parts, and chiefly within the tunics;* it comprised spheres composed of fatty aggregations and emulsions, the products, in turn, of a metamorphosis of the vascular walls themselves, and probably also of other elements deposited between the vessel and the adventitia. The form described by Kölliker was seen several times by Virchow in cases of cerebral apoplexy. He describes the external, entirely structureless hyaline membrane of the vessel (the adventitia) as raised off the vessel in varying degree, and the blood infiltrated into the interspaces, without any rupture being discoverable either on the inner or middle tunics. He states that the adventitia is everywhere present as a homogeneous, very expansible layer

which may be raised off the vessel in large sacculi, by the mere imbibition even of water. Sometimes the adventitia is continued on to the capillaries, and not rarely a cellular formation is to be found between the vessel proper and the adventitia. He says further (p. 458, loc. cit.), with regard to the cerebral arteries, that their dilatation may occur without the slightest demonstrable change of the elements of the vascular wall, nor any morbid process in their vicinity. Nevertheless, he regards them as aneurisms produced by disturbances of nutrition, although he does not refer them to any *specific* morbid process.

Charles Robin (5) distinguishes three varieties of capillaries in the nervous centres and their pia: 1st, capillaries of a diameter of 0.007–0.23 mm., with homogeneous basement membrane, and oval nuclei longitudinally directed; 2d, capillaries of 0.03–0.07 mm., with the same membrane, supplemented by a second fibro-cellular layer, whose nuclei cross the nuclei of the former, in direction: 3d, capillaries of 0.06–0.15 mm. in diameter, and provided with a third connective-tissue membrane of a thickness of from 0.01–0.07 mm. He adds that, according to the traditional view, many of these vessels would be classed as arteries or veins. The fibre-cells are very transparent, according to the same observer, who employed a solution of ten parts of nitric acid to a hundred of water, in order to render them visible. The third layer above-mentioned he describes as homogeneous or lightly striated, transparent, *separated by a distance of* 0.01–0.03 *mm. from the other two membranes, the space thus formed being filled by a colorless fluid* containing small molecules and free round nuclei of 0.005 mm. diameter. After the fortieth or forty-fifth year, fatty cumuli and granulations up to the size of 0.02 mm., as well as granular blood-pigment, but no blood-corpuscles, are found. He states that this membrane is not found on vessels exceeding a third of a mm. in diameter, and it is altogether peculiar

to the vessels of the nervous centres. He never observed any rupture or tear in it, and all the features described by him he says are visible in normal brains.

Although it is difficult to glean from the description of Hasse-Kölliker what these observers actually saw, it is in the highest degree probable that Kölliker, in his later investigations, distinctly saw the space of Virchow-Robin; while the description of Virchow, and still more so that of Robin, are of unexceptionable clearness.

This space might be very well termed an *intertunical* or *interparietal*, but I prefer not to make any nomenclatural innovations, no matter how accurately descriptive, as, in the first place, their proposition is too late, in view of the confusion prevailing on this head, and because the term, "space of Virchow-Robin," if not descriptive, has the advantage of brevity.

Six years after the publication of Robin's paper, His (6) published his method of demonstrating these spaces by injections. He described them as a system of perivascular canals, and brought them into relation with the lymph system. Inasmuch as many writers, in blind obedience to the weight of His' name, accepted his name, instead of investigating the thing itself, that observer may be held responsible for that confusion referred to in the opening, and whose most recent propagator, Huguenin, actually revels in a maze of erroneous views, notwithstanding Frommann's (7) exposure of the contradictions existing between the observations of His and his conclusions, as well as the demonstration of the artificial nature of the spaces, which the latter regarded as produced by the injection of fluid, while he called attention to the fact that Robin's space is not "perivascular." In order that I may not be suspected of being unduly severe on Huguenin, I cite the pertinent portion of his book (8).

After stating (p. 232) that Robin and His have described

lymph-spaces which surround the vessels in the shape of sheaths, he says *verbatim:* "All arteries, veins, and capillaries are surrounded by a space which separates them from the contiguous brain substance. These numerous spaces communicate, at the surface of the brain, with a fla gap, which—situated between the pia and the brain sur face—surrounds the entire brain. This 'epicerebral lymph-space,' in its turn, communicates with the lymph-spaces of the pia. His denies the existence of a special wall of the perivascular spaces. Kölliker describes a structureless membrane surrounding it externally; it should be stated here that numerous trabeculæ are found between the vessel and the wall of the perivascular space, which, so to speak, hold the vessel suspended. Generally these spaces are regarded as lymph-spaces, and indeed numerous lymphoid bodies of different forms are frequently found in them." So far Huguenin. Let us examine what the real facts of the case are.

Considering the interpretation I have above made of Robin's space, to the effect that it does not *surrouud* the vessels, but is intertunical or interparietal, it is superfluous to discuss the first clause of this citation, which may be regarded as disposed of; not so with regard to the other clauses.

It is not correct that *all* vessels are surrounded by a space, separating them from the brain tissue. This is true only of a portion, as I have convinced myself from a study of several hundred specimens prepared after the most various methods. Further, it is incorrect that a flat gap surrounds the *entire* brain; that the epicerebral space—which, by the way, has long ago been demonstrated to be an artifact due to forced injection—*communicates* with the lymph space of the pia; for this *lymph space* of the pia and the epicerebral space are one and the same thing. If the author meant the lymph channels *in* the pia, he should

have expressed himself with more clearness. His denies the existence of a separate wall of the perivascular spaces —in this he is correct. Kölliker describes a structureless membrane on the outer side—in which he is also right. For His speaks of a *perivascular* space, and this is bounded by the loose mesh-work of the neuroglia (as I shall show below), while Kölliker describes the *adventitia*, and correctly. The numerous little trabeculæ which hold, "so to speak," the vessel suspended, are naught else than the numerous neuroglia-fibres, which form very wide meshes here, and, as I shall show when describing them in the sequel, do not hold the vessel in suspense at all. Such expressions as "so to speak" are not physiological, and had better be avoided in such descriptions. These spaces, too, are not at all "generally" regarded as lymph spaces, and the casual occurrence in them of lymph bodies is as little a proof of a lymphatic character of these perivascular channels as that a connection between them and the thoracic duct is demonstrable or even probable. The citation contains actually more erroneous assertions than clauses. It is to be hoped that its writer will duly regard these points when the second part of his text-book appears, and in speaking of things which he is not familiar with through observation, but regarding which he assumes the position of a teacher, rather *quote* than misinterpret investigators.

Returning to the main subject from this digression, we find that Roth (9), in 1869, observed fine filaments in sections of hardened brain tissue, which united the brain tissue and the walls of the contracted (?) blood-vessels. Obersteiner (10), who adopts and agrees with His' views, proved, in his opinion, the existence of similar slits around the nerve tubes and even around the ganglionic bodies.

Four years after the publication of Frommann's researches, His found a second opponent in Golgi (11), who exposed the insufficiencies of his views and those of his

followers in a thorough and convincing manner. Boll (12) confirmed the views of Golgi to the fullest extent, describing the vessels dragged from the brain substance as surrounded by a loose, structureless sheath, in which numerous lymph bodies could be recognized.

A somewhat individual position is that occupied by Batty Tuke, in his paper on the "Morbid Histology of the Brain and Spinal Cord Observed in the Insane" (13). He differs with the theory of His in regard to the existence of a perivascular channel. He says the following on this head.[1]

"But as the existence in health of a space between the brain vessel and the vessel is now more than doubtful, this term must be departed from, and the following experiments and observations are put forward to indicate that the existence of a canal around a vessel is an abnormal condition. . . ."

"In every section I have examined in which blood has remained in the vessels, there is no evidence of the existence of a perivascular canal. . . ."

"Even supposing the actual existence of a small lymph space around a cerebral artery, it is difficult to understand how the backward flow of its contents could be carried on against the constant counter-impulse of the blood. His himself has abandoned the theory, and Key and Retzius confirm him in his departure from it. A perivascular canal must be regarded as a morbid condition, and in this indicative sense the term will be in future employed by me."

Since I am not acquainted with Batty Tuke's paper in the original, but only as cited in Deecke's article on the perivascular spaces of the nervous centres (14), in which other historical notices may be found, I will emphasize

[1] Page 10, loc. cit.

right here that the contradictions which Deecke claims to find between the passage just cited and the one to be next cited are only in part well-based. Deecke says, speaking of the alleged contradiction: "However, at the same time, he denies the existence of a lymphatic sheath around the vessels of the brain and the spinal cord, and gives us the description of a thin hyaline membrane, as thrown out by the tunica adventitia which invests the vessel in many forms of cerebral disease."

In reality, Tuke denies the existence of a lymphatic sheath outside of the wall elements proper, just as Frommann and Golgi do; in describing a "thin, hyaline membrane," he evidently describes nothing but the adventitia, although erroneously ascribing to it a pathological significance. Tuke says in the sequel:

"There exists some discrepancy in the description of this membrane by various authors, some speaking of it as a cellular fibroid secondary sheath, others as a hyaline fibroid, and others as a purely hyaline membrane, homogeneous and clear, which at first is non-fibrillated, but as it goes on contracting becomes less hyaline and more fibrous, like a sheath."

"The examination of a very large number of prepared sections and of recent specimens has convinced me of the existence of a membrane *outside the adventitia* to which the two latter descriptions are applicable. *I believe it is continuous with the sheath of pia mater* surrounding the vessels as they enter the substance of the brain, and *that it exists around every artery as its normal sheath*, although in perfect health it is not easy of demonstration. Robin found it in every subject he examined, and Clarke demonstrated it in the brain of a healthy young man who had been accidentally killed, and I can show its presence in the medulla oblongata of a cat killed by cut throat. In health it is exceedingly thin, perfectly homogeneous, non-fibrillated;

in fact, a pure, hyaline membrane, forming a somewhat loose envelope to the vessel. At bifurcations it is not intimately applied to the angle, but forms a triangular sac, and becomes again continuous a short distance beyond it. In the same way it ensacculates abnormal tortuosities and kinks. Judging from the fact that it is invariably demonstrable in empty perivascular canals, it would appear that it is rendered thicker by being subjected to lymph exudation. It also becomes more apparent in advanced age. When in this condition it is easily recognizable in the *pia mater*, which has been treated with water only for the purpose of cleaning, and in squeezed-out fresh brain which has received no treatment at all. It is true that glycerin, camphor-water and other agents render it more obvious, but their employment is by no means necessary. In the highest form of morbid development it is to be seen intimately attached to the brain-wall of a perivascular canal. So closely does it adhere at times that it can be seen lying on the surface of the section, having been dragged out by the knife, but still clinging to the edges of the canals."

The conflict of opinion signalized by Tuke depends in part on a confounding by the writers referred to, but in other part it is only apparent, and is easily settled, according as we regard the hyaline membrane (adventitia, in connex with the trabeculæ of Roth, which pass into it from the neuroglia or separately from the latter). The way of tearing out a vessel comes into play to this extent, that the trabecula may remain attached to the outer (neuroglia) or the inner (adventitial) side of the space of His; in the latter case, the inner aspect of the neuroglia may acquire the appearance of a more or less distinct wall, owing to the application of the fibrils; in the former case, their application to the outer side of the adventitia gives the latter a striated appearance.

In the following citation from Tuke,[1] it is true that there is a contradiction. The contradiction in this passage can be explained by supposing that Tuke, in his earlier observations, mistook the tunica media for the adventitia, and thus failed to recognize the true nature of the real adventitia raised at places, and which he, aside from the misapprehension in questions, describes most excellently and in complete agreement with all other investigators. According to this, my view, there is no occasion to assume with Deecke that we have to deal here with an entirely novel "interpretation," nor am I aware that any of the recent writers had anywhere seen even a trace of a *fourth* membrane.

Deecke states that he conducted his own investigations on the brains of nineteen insane and one sane person, dying in consequence of an accident. He found in all cases a lymph-conducting sheath around the vessels. What the anatomical relations of this sheath are it is impossible to glean from his description, as neither the contiguous structures nor the space proportions and dimensions are taken into account. He may just as well have seen and attempted to describe the space of Virchow-Robin as that of His, especially as his material was chiefly composed of diseased brains, in which the neuroglia in the neighborhood of the vessels appears granularly condensed, so as to simulate an independent membrane. To this is to be added that the heading of his article, "Perivascular Spaces," is improper, if applied to the space of Virchow-Robin; for the adventitia is without any doubt to be considered a part of the vessel, and the space therefore vascular, not perivascular. In the course of his further disquisition, it becomes evident that he must have seen the space of Virchow-Robin, for he says in one place:

[1] Page 454, loc. cit.

"It is evidently nothing more or less than the adventitious coat of the vessel itself, destined to carry away the overflow of the blood, the plasm, which has exuded from the capillaries into the tissues, and which has not been taken up again into the venous current."

Quite aside from the teleological views as to destiny (destined), I consider the expression "to carry way," without any indication as to "whereto," unhappy. "To receive" and "to carry away" are distinct conceptions. A similar *lapsus* is to be found in His with reference to the perivascular slit spaces. I should also like to know *how* the contraction of the brain vessels and the absorption of fluids in the lymph spaces, which Deecke asserts, has been *observed*.

Deecke further states that the only microscopical elements are the filaments which traverse the spaces transversely, and which constitute a connection between the dilated[1] brain tissue and the surrounding vascular sheath, whose signification he asserts that he has determined to *his* entire satisfaction, declaring them to be simply representatives of so-called Deiter's cells. Easier said than proven! At all events, this declaration cannot even pretend to originality, since long before Deecke several observers hazarded a similar explanation. We will return to the question, as to whether these filaments are cell-processes or not, in the course of the discussion on the neuroglia.

In conclusion, Deecke recommends the examination of fresh brain tissue in *indifferent* fluids, as which, for example, he reckons water. As a beverage water may be, as a medium for histological examination it certainly is not, "indifferent," according to the unanimous verdict of scientists, and I should not have mentioned the matter if Deecke had not laid special stress on such examinations.

[1] How so dilated?

While the existence of uniting threads between the neuroglia and the vascular wall is generally conceded, although there is some difference in interpretation, there is less unanimity as to the existence of a connection between the adventitia and intima (or media). As far as I can learn, it has not been observed by any one, and, indeed, is altogether denied by several, among whom Boll actually declared that they positely *never* exist.

Arndt (15) has recently maintained the *constant presence* of the space of Virchow-Robin; but it is not difficult to satisfy one's self that the different conclusions of Robin on this head are correct, and, indeed, the overwhelming majority of observers agree with him.

After familiarizing myself with the literature, and making a careful study of my own specimens and those of others, I have arrived at the following results and conclusions:

With reference to spaces, two different ones must be distinguished, namely, the spaces of Virchow-Robin and the spaces of His.

1. *The Space of Virchow-Robin.*

This is a true lymph space, although but an adventitial one. It is to be found (*a*) between the endothelia or intima (if present) and the adventitia capillaris of the true capillaries, or (*b*) between intima and adventitia in capillaries of a venous character, or finally (*c*) between muscularis (media) and adventitia in capillaries of the arterial character, or capillaries in the wider sense.

The capillaries of the brain are often of extreme tenuity, and appear, on the whole, to be the most delicate in the body of mammals. While Robin assigns as a minimum calibre 0.007 mm., I have found such in alcohol-chromic acid preparations which positively did not exceed 0.0065–0.0055. In the gray substance of the rabbit (alcoholic

specimen), I even found some of 0.0037 mm., and consequently much smaller than the lymph bodies of fresh serum or glycerin specimens, which measure 0.0068 in diameter, and less.

An adventitial tunic (perithelium of Julius Arnold) is present in by far the majority of these vessels. Frequently, indeed, it is quite difficult to recognize it on account of its homogeneous character. In transverse sections, it can be seen nevertheless, but is very shining. The use of the designation perithelium instead of adventitia, as recommended by some modern writers, is, in the first place, superfluous, because we are not even agreed as to what is to be designated as adventitia, and in the second, it is erroneous, because the adventitia comprises elements of very different kinds within itself. While normally it is of about the same diameter as, or at most but little thicker than, the membrane proper (capillary membrane), the pathologically raised adventitia may be so much thickened as to apply itself closely to the neuroglia; not infrequently did I observe this in the veins—their thickness in the case of insane brains equalled the diameter of the vascular lumina—usually, however, it is not quite as great. Naturally, under such circumstances, the space of His cannot be recognized.

That the spaces of Virchow-Robin and of His have been frequently confounded is indubitable in the face of what has been said previously. I will here give the discriminating features of the two, speaking of them as spaces only, and not entering into a discussion of their anatomical and physiological connections.

The space of Virchow-Robin is usually very narrow, sometimes extremely so, and usually of even width, while the space of His is much wider, especially in the case of empty vessels, and of varying calibre. Even in apparently healthy individuals (human and animal) the space of Vir-

chow-Robin may be found dilated in spots. The borders or sides of this space are smooth ; those of His' space are covered with filaments. The only common feature they have is, that they do not occur on all vessels, notwithstanding the assertions of Arndt' and others, who attribute to all capillaries everywhere two tunics. Just as not all the smaller capillaries have the space of Virchow-Robin, so it does not occur at all in those whose diameter exceeds 0.35 mm. I could convince myself of the general correctness of Batty Tuke's observation, that the degree of vascular fulness has an influence in modifying the distinctness and demonstrability of the space of His, yet I sometimes found this space narrower or wider, with well and with badly injected vessels, without being able to establish a connection between the two factors. The error must be avoided of regarding the space which is sometimes observable between the intima and the blood column as the space of Virchow-Robin in capillaries which have no adventitia. In my own observations, the width of this space was from 0.001 to 0.003, rarely 0.01 mm., which would about correspond to the width of the space of Virchow-Robin. The darkly-contoured blood-column simulates a special tunic, and it is even difficult to decide always whether it has a double or a single contour, particularly as there are structures in the brain which have an indistinct membrane. Here and there, however, the blood-column will be found to be broken or interrupted, and here the observer will be able to correct any errors into which he may have fallen.

In some subjects, both of normal antecedents as well as those afflicted with passive hyperæmia, I found Virchow-Robin's space frequently interrupted in places in smaller capillaries, and entirely invisible, that is, absent, as well as the space of His, in larger capillaries of the venous kind.

[1] Loc. cit., p. 17.

In the case of fusiform dilatations, sometimes in the number of two or three situated one behind the other on the same vessel, the tunica adventitia was in one case markedly raised off; in the other it followed the media, leaving the space of Virchow-Robin of even width throughout. I found the same conditions in the pia. When the space of Virchow-Robin is dilated, the lumen of the capillary is usually found eccentrically situated in transverse sections. In a vessel in an isolated situation at the margin of the gray substance near the medullary lamina whose diameter was 0.0154 mm., I found the space of Virchow-Robin gradually increased from 0.0018–0.0037 mm. At a neighboring spot, where the lumen of the same vessel was 0.013 mm., the space of Virchow-Robin measured 0.0038, that of His 0.005.[1]

As to the contents of this space, I found, under normal circumstances, lymph and (more rarely) white corpuscles; in pathological states: lymph, white and (more rarely) red corpuscles (venous engorgement). Where vessels are bent, either normally or as the result of pathological states (fluxion), the space of Virchow-Robin follows the change in course, without undergoing any diminution in its lumen, almost constantly in the former, and frequently in the latter case. I found it thus in vessels running a simple wavy course, as well as in the case of arterial capillaries with fusiform dilatations. But considerable raising up is observed in pathologically altered vessels, as well as in those otherwise appearing normal, especially at bifurcations and bends. In such cases I found the red corpuscles more axially, and the white ones more peripherally arranged in the lumen, here and there extravasated, especially at bends, and sometimes on the outer side of the adventitia, like beads strung in a row. In other cases of venous stasis (rabbits), I obtained, in addition to the dilatation of the space

[1] Alcohol-carmine specimen from rabbit.

of Virchow-Robin, an *apparent* rupture of the vessel; I say apparent, because the non extravasation of blood into the space of His speaks against the rupture of an aneurism, and a resorption of any possibly present extravasation is to be excluded, owing to the short length of time elapsing after the occurrence, the veins of the neck having been ligated, in order to produce stasis, only a few days before killing the animal. I am inclined to believe that the vascular segment in question, the apparent seat of the tear, had fallen below the level of the section, owing to a bend.

Incidentally to his description of yellow softening, Rindfleisch (18) says: "I found the adventitia throughout raised off, as if an interparietal lymph-space had developed." It is remarkable that this investigator should have devoted so little attention to the in cerebral diseases so important, and normally so commonly found, space of His-Robin, in his anatomical introduction to the chapter on "Anomalies of the Nervous System," and makes no mention of the even normally occurring expansions of this space.

In transverse sections of veins, the inner tunic (membrana interna s. propria) appears as a dark, shining line, the lifted off adventitia runs a little wavy, and the dilated space of Virchow-Robin contains numerous lymph-corpuscles which I can trace through to the space of His, far into the neuroglia.

Although the neuroglia-fibres which dip into the adventitia are not strictly to be considered as integral parts of the latter, yet the surmise is natural that similar filaments must be present in the space of Virchow-Robin. In a verbal communication made to me by Professor Frommann, in the summer of 1875, he expressed this surmise, although he had not seen it; he also held that they were torn through in the dilated condition of this space. My own researches had had no other than negative results. The little transversely or diagonally running strands

which I at first took to be such filaments I have felt compelled since to regard as foldings in the considerably contorted vessel.[1]

With regard to the trabecula of Roth, already referred to, the following is to be observed. They are the continuation of the finely-fibred neuroglia network approaching and joining the adventitia. This network suddenly becomes wider in its meshes near the vessels, and finally only a few strands are left to join the vessel, leaving wide meshes between them; these fibres may tear either by the knife, in consequence of hardening, in the normal brain, or in consequence of dilatation of the space of His, or kinks in the vessel. It is thus that the spinous appearance of the adventitia is produced. It is also the *modus* of the tearing, sometimes remaining adherent to the neuroglia, sometimes to the vascular side of the space of His, sometimes even in a festoon-like pattern, supports the view that they are meshes of the neuroglia, and not at all cell processes. At the same time, we may infer the true network structure of the neuroglia from this appearance, and if Huguenin proposes to adhere in the future to his dictum, that the attempt to derive the neuroglia from a net-like structure, has not proven successful, he may be reasonably expected to controvert the reasons advanced by me in favor of such a view, as a preliminary.

2. *The Space of His.*

This space has been erroneously called a lymph-space. As a mere space, it is of course demonstrable, particularly in the neighborhood of empty vessels, and even around delicate and full capillaries. It is also to be found occasionally, particularly in pathological conditions, filled with lymph-corpuscles; but it must, nevertheless, not be

[1] While preparing this paper, I read in a communication of Frommann that has discovered and established the existence of such filaments.

regarded as a pre-existing space. While the outer side of the adventia is lined by an endothelium whose rhomboid, mono-nucleated fields can be demonstrated by nitrate of silver treatment (lines of Recklinghausen), and which corresponds to the epithelium of the lymph-vessel (perithelium of Arnold), the face of the neuroglia corresponding to the vascular surface is devoid of such a covering. The analogy with a lymph-space is therefore lacking. Usually the vessels traversing such spaces lie a little eccentrically, and this more so in case their course is undulatory, irrespective of the cause for such deviation; in other words, the relations repeat those of Virchow-Robin's space.

In one expanded vessel, of an average diameter of 0.0503 mm., I found the unthickened adventitia applied to the neuroglia in places, and in other places the space was 0.0038 to 0.0077 mm. wide, that is, from one to two-thirteenths of the vascular diameter. With other vessels of the same specimen, and of a diameter of 0.0077 mm., the space of His was but one-fourth or one-half of the vascular diameter. Vessels in the same specimen measuring 0.0038 mm. in diameter, had the space of His only 0.0003 to 0.0007 mm., that is from one-tenth to one-fifth of the vascular diameter. The space of His is, consequently, comparatively narrower with larger vessels. In the case of vessels with blood, respectively lymph extrusion, this relation is naturally reversed. With vessels of the same specimen, with a diameter of 0.0387 mm., which I could follow in good focus and distinctness for a distance of 0.4 to 0.5 mm., I found side by side with an evenly expanded space of Virchow-Robin, no space of His at all; and similarly no such space in vessels of a diameter of 0.0077 to 0.0193 mm.; only in exceptional cases, for example, with a vessel of 0.0116 mm., did I find His' space 0.0193 mm., that is, nearly double the vascular diameter. All these

figures were obtained from alcohol-carmine preparations obtained from rabbits in whom I had artificially produced venous stasis. In places where His' space exceeds the proportions given, this may perhaps be due to imperfections in the section. The extent to which this may apply might be determined by numerous comparisons of the congested with the normal brain. Sudden dilatations of the space of His must always be open to the suspicion of being artifacta. In general, I found the space greater (wider) with capillaries of small calibre than with larger capillaries of a distinctively arterial or venous character, without there being any adventitial thickening to account for this in the latter case.

The calibre of this space is variable in different vascular districts. Around *capillaries without adventitia*, the space of His is demonstrable only by injection, and without such injection does not exist. In this case, the fibrils of the neuroglia directly unite with the intima or its endothelium. Opposite the indentations of the vascular lumen, an expanded space of His is frequently observed. Similarly it is in the case of vessels with fusiform dilatations, dilated at the narrower parts of such vessels. I cannot understand what Rindfleisch means when he says (loc. cit., p. 554) that reference has been had (he does not say by whom) to have only the weakest capillaries, entirely devoted to nutrition, and not subject to changes in calibre, enter the nervous tissues. It is true that the comparatively large space of His surrounding the smaller capillaries would seem to show that they can expand but very little; but it is certainly going too far to say that they are not liable to any changes in calibre.

It is stated that there is a connecting slit between the space of His and the adjoining, if not all, ganglionic bodies. In many cases, I have seen such a gap passing from the space of His to the nearest ganglionic body, but consider

it to be artificially produced. At any rate, it is my opinion that an investigation of this particular point is not among the pressing necessities of the hour. The remarks made above apply also to the spaces surrounding the apparently free nuclei, as well as the ganglionic cells, which I frequently found of large dimensions in man, but which are rather dependent on the strange shapes of the ganglionic body (the result of shrinkage?) than on the pericellular space, though I have seen the latter.

II. THE NEUROGLIA.

The neuroglia is also variously known as supporting substance (Stützsubstanz), nerve glue (Nervenkitt—Virchow), perineurium (Rindfleisch), ependymal tissue (Ependym-Formation—Rokitansky), connecting substance (Bindesubstanz—Kölliker), spongy substance (schwammige Substanz—Deiters), fused ganglionic substance (zusammengeflossene Ganglienmasse—Henle and R. Wagner), nervous tissue (Nervengewebe—Stilling), reticular structure and reticulo-molecular connecting substance (formatio reticularis *and* reticulär-moleculare Bindesubstanz—Meynert). This latter expression must not be confounded with the similar one (reticuläre Bindesubstanz, s. adenoides Gewebe of His), applied to the connective substance of lymph glands and similar organs, and whose meshes are filled with lymphoid cells.

Imperfect as our knowledge concerning the neuroglia of the simple medulla is, it is still more so with regard to that of the gray substance, as this is much more difficult to examine. This uncertainty is responsible for the numerous, often conceptionally diametrically opposed names applied to it.

The neuroglia as a whole consists of a network produced by numerous anastomoses, whose fibres have been variously interpreted by different observers, and of cells and cell-

like elements, scattered in this network, whose nature is as yet open to debate.

1. *The Neuroglia in the narrower Sense.*

It has been claimed that the neuroglia has a special basis substance. But I have not been able to convince myself of its existence; on the contrary, it seems to me that the neuroglia itself should be regarded as a basis substance. Nor could I find it traversed by the fine elastic fibres which B. Hofmann[1] asserts the existence of; at all events such a view is not of general applicability, if not, as I have reason to assume, it is due to a misinterpretation. Max Schultze (18) is the first who regarded it as a connective spongy substance, even where its appearance was granular. Even to this day some describe it as being finely granular or as fibro-granular, a few describe it as being purely fibrillary or as spongy and fibrous, which view is gaining in favor, and which my own investigations are calculated to support. Stephani (19) who also recognized it to be a network, nevertheless regards it to be of a nervous nature, besides him, Stilling alone appears to maintain that it has such a nature. Uffelmann (20) indeed goes so far as to regard it as an artificial product of coagulation. When Kölliker states that even with high magnifying power the neuroglia does not reveal an appearance that can be unquestionably interpreted as a network, and that with ordinary (a very vague expression) magnifying powers it seems simply granular, I will not deny that under certain circumstances this impression may appear justifiable, but must insist against this that in brains of the most different animals of every age, and examined in the freshest possible condition, I have universally found the neuroglia to be a fine fibrillar network. It appears granular but exceptionally and in limited areas, as for example on the borders

[1] Professor in Physiological Chemistry in Graz.

of the space of His. I used, in my examinations, among other objects, living mice, whose brains having been exposed, the brain-tissue was removed from these to a slide maintained at the normal temperature of the animal. Boll supposes that the dotted appearance of the neuroglia is not due to the fine rami of a network, but to the presence of darker molecules imbedded in the sparse basis substance. He finds that the granulation is not regular, but arranged in figures resembling frosted surfaces; he does not say what surfaces and where these have their analogue in the brain tissue; and it is evident that he has based this description on granularly disintegrated or disintegrating nets. According to other observers, the finely punctate appearance is due to the imbedment of a number of the finest granules in an albuminoid substance, of thus far unknown properties. Deiters considers the basis substance to be a fusing or fused protoplasm of formative cells, dating from a period of development when the nervous and non-nervous tissues had not been yet differentiated. Others believe the neuroglia to be a system of connective-tissue cells, surrounded by an infinitely fine net of areolar connective tissue; still others believe it to be a homogeneous tissue basis with imbedded granules of dot-like appearance, and of the smallest dimensions.

Meynert regards the gray substance, so far as it is not nervous, as composed of a diffuse and a formed portion. The diffuse part, which stains a little in carmine, becomes opaque by the appearance of dark molecular puncta, which *perhaps* appear only after death. These dots cannot altogether be interpreted as the transsections of fibrils of the network, and are visible with the high magnifying powers revealing the ramifications of the latter. The claim of other investigators that the neuroglia is a felt-like intertwining of the finest ramifications of the nerve-cell processes does not, in my opinion, merit discussion. Hugue-

nin says on this head: "The external cortical layer which shows the neuroglia in its present form comprises one-tenth of the entire cortical thickness in man, and one-third in the calf. A tissue which increases as the mental functions decrease cannot be the medium of such functions."

I quite agree with Huguenin, with this specification, that by mental functions we should here understand the conceptional and volitional faculties, as contra-distinguished from the co-ordinated reflexes which develop without the intervention of consciousness; still I consider the number of examples adduced by Huguenin too limited to sustain so important a proposition. The figures of Meynert, from whom Huguenin undoubtedly obtained his, as well as the conclusion he draws from them, are much more numerous.

In the chapter on the cells and cell-like structures, I will advance a further reason for regarding the neuroglia to be of a non-nervous nature.

Rindfleisch discriminates in the gray substance between a continuum of finely-granular and also spongy, finely-reticular "substance" which fills all the interspaces between the cellular elementary portions and the vessels—on the one hand—and the "neuroglia." The former "substance" he regards as nervous, and as the proper functional organ; the neuroglia he conceives to be of a connective-tissue character, while its network of connective-tissue cells, with its finest processes, is the *only* basis substance, properly speaking.

This explanation seems quite plausible. But when we consider the matter from its anatomical point of view, it is desirable, above all, to see the anatomical substratum on which the view rests. I, for my part, must confess that I am unable to discriminate, side by side in the same specimen, between a spongy, finely-reticular substance and a fibrous, spongy network of connective-tissue cells. Credulity is no longer so common a factor as it was before

the days of exact scientific research, though I do not mean to imply that what is visible to some is necessarily visible to all.

I should like to direct attention to the not at all slight resemblance existing between a non-cerebral structure with the pure gray substance. This is the homogeneous, finely-granular, nucleated, and delicately-molecular neuroterminal cumulus (Kühne's End-hügel) of the muscles in saurians and mammals. Possibly a comparative study of this unfortunately equally delicate and decomposable structure may lead to a clearer understanding.

Finally, there is one fact which merits consideration in determining the possible *nervous* nature of the neuroglia —a fact which does not positively bear against its nervous nature, namely, that the nervous tissue appears in the more specialized forms (in shape or nerves, nerve-cells, etc.), the higher the functional capacity, and the higher the organization of the animal. Who would maintain that an animal is without sensation, because nerves are not demonstrable in its body? It can be experimentally proven that certain of the lower animals devoid of any organs, or at least without nerves, can appreciate light, and have a tactile sense. In the light of these observations, there is nothing to oppose the view that we have to deal with a diffuse nervous tissue in the neuroglia. In the same way, a few observers have supposed that the muscular end-plate above referred to is a non-differentiated but for all that not necessarily non-sensitive diffuse nervous substance.

The proportions of the purely gray layer to the other layers of the brain-cortex prove merely that the higher an animal is organized, the more of its nervous substance appears in differentiated shapes, and that in the unformed shape it cannot be the substratum of mental functions. All these considerations simply prove that we are unable

to demonstrate positively either the nervous or the non-nervous nature of the neuroglia. It cannot be denied that it possibly is a partly nervous tissue of a low grade of development, and that in the course of a non-computable period of time it mediates the development of ganglionic elements. But it is for this very latter reason that I cannot agree with Rindfleisch in his view that the granular and finely reticular "substance" found with the neuroglia is the "proper functional organ."

As for the granulation, I believe that it may be interpreted in either of three ways: 1st. As a post-mortem appearance, *i. e.*, the result of coagulation of an intra-vitam normal, but now physiologically dead structure. 2d. As a pathological appearance, in which case the granulation is just as fine, but much closer. 3d. As a combination of the two foregoing. The choice between these various interpretations, of course, must depend on the existence of other reasons for assuming either the normal or pathological constitution of a given tissue specimen.

In the preceding, attention has been several times directed to the fibrils traversing the space of His, which have by some been regarded as the prolongations of Deiter's cells. Even if this view were correct, it would not facilitate a clearer comprehension of the structure of the neuroglia. The only significance I can attribute to these fibres is that of a continuation of the finely fibrillar neuroglia network, whose meshes become wider and coarser in the neighborhood of the vessels. It is the coarser fibrillæ around these meshes which, in case of dilatation of the space of His, or of vascular bends or even in the normal state, may tear off in sections of hardened tissue, and so produce the spinous appearance of the adventitia. I should think this fact alone a sufficient proof of the fibrillar structure of the neuroglia. At some places, I

was struck by a shining appearance of the glia fibres, and at others they appeared thicker, as if by imbibition.

The fibres traversing the space of His take up carmine distinctly, while the granularly disintegrated part of the neuroglia does not stain at all, or, at best, feebly. The fibres traverse the space of His at irregular intervals. Sometimes after tearing off they present a festooned arrangement, an evidence that the convexity of the festoon-arches is directed towards the vessels as a rule, more rarely towards the glia; and in other cases peculiar double arches are seen with such either convexly or concavely disposed towards the vessel and the glia border (chromic salt and alcoholic specimens from man). Sometimes the uniting fibres of the glia may appear to be absent. This appearance is due to the fact that the thickened and separated adventitia is in direct apposition with the neuroglia, so that its loose marginal nets become invisible by compression. It may be also due to the similar apposition to the glia of the *normal* adventitia in the case of dilated vessels.

Here is also a proper place to refer to the view of Rindfleisch (21). He considers the fibrils passing to the vessels as protoplasmic processes which are in communication with a system of *juice-cells* (?) of the neuroglia. Probably he refers to the nuclei. These supposed protoplasmic processes of Rindfleisch, which he derives from the fibrillar thickened adventitia, and describes as passing outward, and as giving it a strange spinous appearance, are in my opinion nothing more nor less than torn off fibres of the glia.

I have seen granular disintegration of the glia so extensive as to render the granular structure invisible only in case of passive (engorgement) hyperæmia, and then proceeding from the border of the space of His.

According to Rindfleisch, everything in the medullary

substance which is not nerve-fibre and vessel is neuroglia; in other words, this comprises the basis substance with its nuclei and granules. Perhaps this is so; but in the case of the cortex it is a much more difficult question to settle what belongs to the neuroglia and what not.

In the cerebellum, the relations of the neurolgia are essentially the same as those in the cerebrum. The same remark applies to the corpus striatum and the other masses referred to in the opening. But notwithstanding the simplicity in the structural type of the cerebellum, we are as much in doubt as to the nature of its neurolgia as in the case of the cerebrum. Widely meshed glia nets of singular distinctness—and I was about to say beauty—are sometimes seen here at the margin of the specimen.

In some specimens, there are found, sometimes in large numbers, roundish or irregular crypto-crystalline, colorless or yellowish bodies. In horizontal, that is, transverse, sections, they are found within the meshes; in sagittal, that is, longitudinal, sections, they are found ranged in rows along the axis cylinders. On addition of sulphuric acid, they take a purple tint, and on the further addition of iodine a bluish color; they dissolve in absolute alcohol, more rapidly in case it is warmed, or with the aid of some volatile oil, and in ether; they are insoluble in water, the ordinary acids, and alkalies. All these are the characters of cholesterine, but they do not show the decided crystalline architecture of that body, as a rule. They are found as products of decomposition even under normal circumstances in the medullary substance, and much more frequently under pathological circumstances. They are not identical with the neurostearine of Hartung which, according to that observer, is deposited in the shape of white opaque prisms, after the brain or cord is subjected to the action of weak alcohol for a few days. Cholesterine, on the other hand, crystallizes in rhombic plates, which by the

blunting of their angles may assume a hexagonal shape. They have the common characters of insolubility in water, nitric and muriatic acid, and solubility in ether and hot alcohol. Very exceptionally the characteristic tabular shape of cholesterine is found in the case of neurostearine. Hartung considers it probable that the latter is identical with Frémy's *acide cérébrique*. In the above described amorphous yellowish bodies, he believes to identify Frémy's *acide oleo-phosphorique*. The investigations of the cerebral fats are not all completed; and even in the best text-books we meet commonly with the designation, cholesterine *and fats*. In the neuroglia of the medullary substance such deposits are much more extensive on account of the more than trebly greater cholesterine percentage of the white substance.

There remains for us to examine the relations of the neuroglia to its epithelial layer. Virchow and Henle state that the ependyma of the fourth ventricle, the thalamus, and corpus striatum, is normally situated on a layer of fibrillar connective tissue, and not on the neuroglia, and therefore but indirectly connected with the glia network. More recently the same view has been advocated by Mierzejewski.[1] In investigating this point, only healthy brains should be used. Pieces are nipped off horizontally with scissors, and macerated in a solution of bichromate of potash of a half a grain to the ounce of water, then teased. The cover glass should be put on very gently, and pressure avoided. If all these cautions are followed, the fine epithelial processes may be traced far into the neuroglia network. The layer of fibrillated connective tissue is either a later physiological condition which appears in advanced life, or it is a pathological metamorphosis of a granularly disintegrated neuroglia. The only question remaining is, at what period of life the change takes place

[1] Med. Centralblatt, 1874.

under physiological conditions; owing to lack of material, I am unable to make positive statements on this head.

THE CELLS AND CELL-LIKE STRUCTURES OF THE NEUROGLIA.

A. Nerve-Cells.

These bodies, also known as nerve-bodies (Nervenkörper), nerve-knots (Nervenknoten), ganglion cells, ganglionic bodies, or ganglionic spheres (Ganglien-Zellen, Körperkugeln), are found in various sizes and shapes almost everywhere in the gray substance of the cortex. In size, they generally increase towards the deeper layers, and are generally smaller and less numerous in animals than in man.

In the cerebellar cortex, we find in its most external purely gray layer, besides so-called free nuclei and small granule groups, three-cornered (räucherkerzenförmige), and fusiform nerve bodies; these are naked, and their protoplasmic processes decompose readily, so that the criterion of their *functional* value is very difficult to find. They are from 0.0074–0.0112 mm. in length, and 0.0018–0.0037 mm. wide. The thickness of the layer in which they occur is, in the rabbit, at the deepest portion of the sulci, on the average about 0.240 mm., and is here thinner than elsewhere. Its greatest thickness is in a line connecting the dipping-point of a sulcus with its neighbor, and is about 0.448 mm.; in the middle, between two sulci, it is about 0.320 mm., and there is every transition between these various dimensions. The cells of the external broadest portion of this layer are turned with their poles towards the external and inner margins, that is, vertically to the surface, while inner narrower part of the layer, which adjoins the cells of Purkinje, particularly at the apex of a folium, are transverse to the just mentioned cells, and parallel with the margin of the granular layer. These are much narrower than the others. In some, very fine pro-

cesses can be seen, and it may be concluded that they are all so provided, and, for this reason, and because of their protoplasm, are true ganglionic bodies. On the whole, these elements are very sparse, much more so than in man.

The second layer of the cerebellum comprises a single layer of cells, striking by their size, the so-called cells of Purkinje. They are of different shapes, which are readily reducible to a common fundamental type. Among the variations from this type I may mention as found in the rabbit, the narrow oval, the broad oval, pyriform, pyramidal, pocket shaped, oblong and round. They are stated to be 0.02–0.03 mm. wide, and 0.04–0.07 mm. long in man.

Fourteen different measurements which I made of eighty such cells, in an alcohol-carmine preparation from the rabbit, yielded the following:

	LENGTH.	WIDTH.
12 cells measured.....	0.0309	0.0232
10 " "	0.0348	0.0271
5 " "	0.0387	0.0155
10 " "	0.0387	0.0271
4 " "	0.0387	0.0309
6 " "	0.0402	0.0322
4 " "	0.0425	0.0159
5 " "	0.0425	0.0270
4 " "	0.0425	0.0271
4 " "	0.0464	0.0271
4 " "	0.0464	0.0387
4 " "	0.0465	0.0238
4 " "	0.0485	0.0265
4 " "	0.0542	0.0232

The average derivable from this figure is about 0.0402 for the long, and 0.0259 for the short diameter of the cells. In the case of pyramidal cells, the width refers to the base. With regard to their shape, the figures above given relate to cells of which three-tenths were oval, the same proportion pyramidal, and four-tenths belonged to the mixed forms.

These cells have all a nucleus which is not round, as is almost universally stated, but as a rule oval, and a

distinct round or nearly round, shining eccentric nucleolus, measuring about 0.0012 mm. The cells have a double contoured membrane, and their substance, as in the case of all other ganglionic elements, is protoplasmic. I have never noticed any other than a slight grayish pigmentation. Sometimes the shape of the nucleus repeats that of the cell, so that it is accordingly triangular or pyramidal, narrow or broadly oval. In most, but not in all cases, the nucleus lies in the long axis of the cell, or in parallelism with the latter. In twenty nuclei distinctly visible and measurable—and only such should be measured—I found the following measurements:

	LENGTH.	WIDTH.
3 nuclei measured.....	0.0077	0.0038
3 " "	0.0077	0.0060
2 " "	0.0116	0.0055
2 " "	0.0116	0.0125
2 " "	0.0145	0.0116
2 " "	0.0154	0.0085
2 " "	0.0168	0.0116
2 " "	0.0192	0.0116
2 " "	0.0193	0.0116

The average derived from these figures is about 0.0131 mm. for the greater, and 0.0083 for the lesser diameter of the nuclei.

The Purkinjean cells themselves are not all vertical to the fibre-course and the direction of the spindle cells of the external layer on their borders, but frequently oblique, or even at a tangent to the latter. Their processes, passing in the direction of the cerebellar surface, leave the cell usually at an obtuse, more rarely at an acute angle. Not rarely they can be traced for quite a distance along the edge of the spindle-cell layer, to curve round suddenly at a right angle into the pure gray layer in which they branch, thenceforth taking the short cut toward the surface. These processes, which may be compared to an *espalier* tree, have the respectable diameter of 0.0032 and over in the neighborhood of their origin. The assertion

that they are distributed in one plane must be taken *cum grano salis*. The finer processes which enter the granular layer often seem to be absent and their covering to be raised bleb-like from the cell body. As far as I know, more than a single such process has never been observed either in man or in other mammals. It always passes into a medullated fibre. In single instances I could trace two rapidly dividing pale and fine processes from a single cell, which were distributed in the granular layer and could be traced for a distance of about 0.0074.

The layers of the cerebral cortex are not as sharply individualized as those of the cerebellar. In the most external layer there are small scattered pyramidal or irregular bodies; these are naked, many are apparently fusiform, in reality they possess branched processes, although I will not deny that true spindle forms may occur among them. They contain a protoplasm, and sometimes a shining nucleolus, so that, as far as their appearance is concerned, and in agreement with the criteria of Deiters,[1] a nervous nature may be claimed for them.

The next layer is composed of more closely crowded nerve cells, also apparently of a pyramidal shape. Those of the layer next following are irregular, measuring up to 0.0280 mm. in length, and 0.0130 mm. in width. Their nuclei are triangular with rounded off angles, of a diameter of about 0.0056 mm., and their nucleolus measures about 0.0018 mm. With these cells there are such which, while of equal length, have but half the diameter. As we proceed more towards the white substance they become smaller and gradually undergo a transition to spindle-shaped attenuated bodies, whose axes are parallel to the border of the white substance, and therefore transverse, while the

[1] These will be referred to in the sequel.

cells of all the other layers are vertical, with their long axes to the surface.[1]

A further discrimination of one or two additional sub-layers might be made if a real value could be attached to the number of layers. I will admit that I have paid less attention to this branch of the subject.

As far as the alleged criteria of ganglionic cells are concerned, I would say that no exact definition has yet been formulated, on the strength of which *alone*, a ganglionic element can be determined to be such. True, it is said a ganglion-cell appears thus and so, is connected with nerve-fibres, etc.; but there are countless cell forms in the brain which coincide with the traditional description as to their general anatomical characters, and yet we are not able to furnish exact proof of their character. Others again can be, *anatomically* speaking, distinguished from ganglion-cells, yet in other points they seem to be of identical nature. What we know of the living, functionating nerve cell, by direct observation, is equivalent to zero. At most we can conclude from the known function of these structures as to their nature, but not even theoretically are we agreed what is to be called a ganglion cell; thus, for example, the true signification of the peripheral nerve cells in the glands and organs of sense is altogether unknown, or at most based on inference.

b. The Nuclei.

These bodies, also called "apparently free nuclei" and neuroglia nuclei, are chiefly found in the outermost, pure gray layer of the cerebellum and cerebrum, in considerable number also in the corpus striatum, and generally throughout the neuroglia. They are usually larger than the granules, and measure in man on the average about 0.009–0.011 mm.

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[1] This refers to alcohol-carmine specimens from the rabbit.

I found the average dimensions of the larger nuclei of the most external layer of the cerebellum to be about 0.0116 mm. in length, and 0.0080—0.0075 mm. in width. Besides I found the following dimensions of individual nuclei:

CEREBELLUM.		CEREBRUM.	
0.0085	0.0058 mm.	0.0077	0.0045 mm.
0.0060	0.0058 "	0.0077	0.0053 "
0.0077	0.0057 "	0.0068	0.0053 "
0.0080	0.0057 "	0.0077	0.0053 "
0.0053	0.0045 "	0.0084	0.0068 "
0.0084	0.0077 "	0.0077	0.0053 "
0.0093	0.0074 "	0.0077	0.0049 "
		0.0096	0.0057 "
Average 0.0076	0.0061 mm.	0.0079	0.0054 mm.

Usually they are seen to be surrounded by a light halo, sometimes without one; their contour is sharp, occasionally double, they contain one to two nucleoli, occasionally three and even none at all; in this latter case a fine granulation is observable. The larger nuclei frequently appear finely granular, with a membrane, the smaller nearly or altogether homogeneous, and with a dull sheen, an indistinct covering, or demonstrably naked. In their interior there are visible single, sometimes indistinct granules; and they are sometimes lighter in the centre than at the periphery. In those with an outer covering, light granular contents and one or two nucleoli with a sort of "granule halo" may be recognized. This term must not be confounded with the granule sphere of certain cells which lies within the cell nucleus near the wall of the latter, while the granule halo lies outside of the cell.

The smaller nuclei resemble the granules as a general thing. Some nuclei may be seen to be surrounded by a delicate granular mass of protoplasm, which, in its turn, contains strongly refractive bodies similar to the granules.

It is, as far as my knowledge extends, generally stated that the nuclei lie in the intersections of the neuroglia net.

It seems to me that, where the whole mass is one maze of such intersections, they could not very well be otherwise situated; but not all intersections are the site of nuclei, and it is therefore, as Boll says, that some cells are represented by a conglomeration of star-like arranged fibres running together, which are devoid of a true cell-body.

As to their significance, it is not at all clear. Many maintain that the neuroglia nucleus is not a true cell, but the part of such, namely, of a ganglion-cell, as its now free nucleus. This may be true of many nuclei, but others certainly are cells. The views as to what constitutes a cell are at this time still divergent. It was with great reluctance that the old definition of Schwann (cell-wall, cell-nucleus, and cell-contents) was abandoned; for it was feared its abandonment would impede the progress of the cell-doctrine. Instead of a cell-wall, many spoke of a membrane, that is, a cell-wall without a sharp inner and outer demarcation, or an essential factor of the cell. But it had long been seen that it could not be asserted in every case: here is a membrane and here not. How, then, should a differentiation be made between the "naked" and the "membranous"? So the "membrane" failed as a criterion, and observers spoke of naked cells, and considered as necessary criteria of a cell a nucleus in addition to protoplasm. Now, superficial still vital epidermic cells, in over thousands of cases, have no nucleus, and yet no one ventures to dispute their cellular dignity. It is true that in this case the destruction of a pre-existent nucleus may be demonstrated. But then, there are, on the authority of R. Leuckart, animals (Monera) and plants (Flagellata) which have the morphological value of cells, and yet never have a nucleus; there also other conditions of cells in which they are devoid of a nucleus. Consequently, it must be admitted that there are non-nucleated cells. Then, also, the nucleated cells are derived from originally non-nucleated

ones, and those with a membrane from such without one, as has been long and satisfactorily shown by the experiments of M. Traube and Kühne. To quote Leuckart's words: "From the non-nucleated protoplasmic clump a continuous developmental series leads to the nucleated, originally non-membranous, and later membrane cell."

So, after all, it is only the living protoplasm which remains as the medium of the vital functions; and what prevents us from calling a mass of independent living protoplasm—the *cytode* of Haeckel—a non-nucleated, membraneless cell, just as well as any other individualized protoplasmic group, no matter how small, which is a component of a larger organism? I am of the opinion that definitions should accommodate themselves to conceptions, and not *vice versa*, and that it is not by mere sufferance and tacit agreement that we call living protoplasm a cell, but that, following our conceptions, we *must* call it so, and cannot call it otherwise, even though the name "cell," owing to the peculiar history of the term, has become strictly inapplicable.

Good physiologists, such as Hermann, in the last edition of his "Physiology," still pronounce the red blood-corpuscles to be no cells, because they have neither membrane nor nucleus. But this reason is evidently fallacious; one would have to be able to say, to be right: because they have no protoplasm, which by-the-by is far from being proved! The possibility that they are the free nuclei of a protoplasm dissolved in the blood-serum cannot be denied *a priori*, even though this new view is not sustained by any investigator of repute.

The question whether the nuclei of the cortex are cells is therefore to be decided bytheir character as to whether it be protoplasmic or not. They are protoplasmic; therefore, they are cells.

With some apparently free nuclei, the observer will see

here and there the more or less shadowed contours of a ganglion-cell, obscured by other elements. This is the more recognizable, the more pigment the ganglionic cell contains; without it, this recognition is impossible. Boll and Deiters are of the opinion that the neuroglia nuclei are the nuclei of the true remaining formative cells whose protoplasm has been utilized in the construction of the intermediate substance. This is most improbable. Another absolutely false view is the one that these nuclei are extramural blood-corpuscles, because the size of the latter is variable and usually much smaller than that of the nuclei, and as finally their distribution would have to be an entirely different one, and be governed by the course of the blood-vessels. That they are the nuclei of dissolved leucocytes is a view which requires no discussion whatever.

The trabeculæ of Roth, coursing across the space of His, are considered by Deiters to be processes appertaining to the nuclei, so that Deecke's "explanation" (*vide supra*), quite aside from its incorrectness, can make no pretensions even to originality.

I have casually observed with passive hyperæmia of the rabbit's brain that these nuclei were increased, and here and there swollen or distorted, sending out projections of their substance.

c. The Granules.

The so-called granules occur in the innermost, or counting from without inwards, the third cerebellar layer, which is therefore styled the granule layer. To the naked eye it appears grayish-red, and under the microscope is seen to be a layer of numerous tightly packed granules, It is thinnest near the bottom of the sulci in the rabbit, being at this place from one-sixth to one-tenth of the entire thickness between two sulci. The distribution of the

granules is very even; only at the confines is it decreased, and that very suddenly. On twenty-five surfaces, of each 0.0387 millimetres square, I counted in *one* plane, with a magnifying power of 220, once 40, 35, and 32, twelve times 30, once 28, and nine times 25 granules, so that about 29 granules was the average number in such a surface, yielding about 750 to the square millimetre.[1] It need not be stated that only the very thinnest sections should be used as the basis of such calculations, for in thicker sections a higher figure would be reached, owing to the counting of indistinctly seen cells of other planes. The above countings were made in different parts representing the entire width of the granule layer.

Granules are also found, not in a distinct layer, but rather scattered, in the gray substance near the confines of the white substance of the cerebrum, and also scattered or in little groups in the other portions mentioned in the introductory remarks.

The granules are small, usually roundish, sometimes pale, sometimes dark (less refractive), more or less homogeneous, nuclei-like structures. They have a, in some instances, dot-like and indistinct, in others distinct shining nucleolus; most of them have no halo. Their size is usually reported as between 0.005 and 0.007 in the human cerebellum; E. Schulze assigns 0.003‴–0.004‴, equivalent to 0.0068–0.0091 millimetres.

A description of the nuclei, aside from their differences among themselves, is rendered difficult by the impossibility of always distinguishing between them and small free nuclei, and the accounts are consequently quite varying. I have examined these bodies in the human brain, as well as in the brains of young and full-grown healthy rabbits, and obtained the following results:

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[1] Alcoholic carmine preparation from rabbit.

The granules are not entirely round, as is usually stated, but somewhat oval. Different measurements yielded the following figures:

LENGTH.	WIDTH.
0.0056 mm.	0.0045 mm.
0.0048 "	0.0046 "
0.0040 "	0.0035 "
0.0045 "	0.0040 "
0.0058 "	0.0056 "
0.0056 "	0.0037 "
0.0074 "	0.0056 "
0.0062 "	0.0057 "
0.0055 "	0.0039 "

This gives us an average of 0.0055 mm. in length and 0.0045 in width.

In the smallest granules, no measurable distance can be found between length and width, and occasionally a nearly completely round granule is found among the larger individuals.

The nucleus of the granule I found to be usually 0.0027 mm. long and about 0.0025 mm. wide. In some granules with a sufficiently high power (not under five hundred linear) fine, short processes may be seen running from the poles. I believe that these are not accidental appendages derived from adhering glia, but true cell components. These processes appeared in some cases to run off, not alone on the equatorial plane, but in several planes, never exceeding five processes in number. With granules of this kind, a clear distinct nucleus can be seen in the interior The processes referred to cannot be confounded with the exceedingly delicate, finely granular protoplasmic appendages of other granules, which do not exhibit such processes. That they are organically connected with nerves I consider improbable, as their connection with these, as well as with the neuroglia itself, is not very firm, for which reason their spontaneous separation is a not infrequent occurrence. In some cases, the hair-like processes can be

seen to come from the interior of the cell, and indeed from its nucleus.

Both in the granular layer of the cerebellum, as well as in the cerebrum, small nuclei-like bodies are to be found among the granules, which are possibly free nuclei of the granules.

There still remains the question of the rôle and nature of the granules. Although, as a rule, they are devoid of a cell-envelope, they must, owing to their protoplasm appendages, have a cellular dignity. It is true that such appendages are not visible in all the granules, notwithstanding that Rindfleisch asserts their constancy. With all their resemblance to ganglion-cells, I do not consider them to be such, because a connex with nerve-fibres is not visible, and there, where filaments approach nerves, this is merely accidental, and the nerves can be seen passing by the filaments without entering into any connection with them. For all these reasons, the view that the granules are nerve-cells, maintained by E. Schultze and others, is at present merely an opinion, lacking the support of observed facts. It can only be demonstrated that many of them have the nature of cells, and it may be assumed that they are in some way of a nervous character. Rindfleisch believes them to be an unused remnant of the embryonic formation cells; in other words, neither of a decidedly connective-tissue character nor of a strictly nervous nature, but protoplasmic. This is a very easy way of getting out of a dilemma; and whether his view, for which he advances no reasons whatever, will prove convincing to others, I will leave undiscussed. Gerlach and Kölliker consider them to be aggregated elements of connective substance, but they are too small to bear that interpretation. According to Henle and Meckel, they are lymph-bodies, a view opposed both by their structure and distribution. Stilling

entertains the view—above stated to be undemonstrable—that they are of a nervous nature.

I have observed an enormous increase of the granules in rabbits in whom I had ligated both subclavian veins. This increase does not support the view that they are of of a nervous character, as nervous elements do not undergo change so rapidly. The appearance thus induced reminds one of the structure of the so-called glioma of the human brain.

III. REMARKS ON METHODS.

Verification of the Micrometer and Measurements.

The difference in the measurements given by various observers are due to two causes. In the first place, the influence of different methods of hardening has not been sufficiently considered in making them. In the second place, too much reliance has been placed on the exactitude of the micrometer subdivisions.

In giving measurements, it is of paramount importance to describe the methods of investigation employed, as all sources of error in observations should be carefully weighed before jumping at interpretations.

Even the most carefully prepared micrometer cannot be absolutely depended on, whoever its maker may be. I employ an objective micrometer of glass, divided into one hundred parts, made by Zeiss, of Jena. With moderate magnifying powers (systems D, DD, E and F of the same maker), a still finer division can be obtained by employing an ocular micrometer in addition.[1] If the objective micrometer is brought into the field in such a way that the first mark of the ocular micrometer covers that of the objective micrometer, and then the number of divisions of the one fall within one division of the other, such a result would be obtained as the following: If ocular 2 syst. D are used,

[1] 5 mm. divided into 50 parts.

19.5; if now a single division mark of the objective micrometer be shoved to one side, and the result read, it would be 19.3 or 19.4, so that among the eighty-one possible displacements, five or six different results may be obtained. By adding these results and dividing them by the number of measurements made, a reliable middle figure is obtained which, with the micrometers named, whose divisions are equivalent to hundredths of a millimetre, and which must be divided by 50 enables us to obtain the true size of the objects measured between them.

According to the focal adjustment and illumination, the single division marks of the objective micrometer are visible as fine striæ; the mark itself is a groove, whose deepest part represents a middle stria, and whose side-striæ are the margins of the groove, which nearly correspond to the level of the glass. Measurements should be only made when all three divisions are distinctly seen, and the middle one is to be considered the actual line. With badly adjusted illumination, improper focusing, and too wide aperture in the diaphragm, from two to four lines are seen, and this may lead to erroneous measuring. As it is much easier to manufacture an accurate ocular micrometer (in which the fineness of the lines is not so important), than an object micrometer, with fine, smooth-edged, equally thick and equidistant lines, the errors originating in the manner mentioned can be at best extremely minute. This method is very tiresome, it is true, but if one has but *once* examined one's instrument in the way related, and construed tables on the basis of such examination, one becomes able to measure with the ocular micrometer alone, with subsequent verification by the tables. This, aside from the economy of time, offers other advantages. In the first place, bodies may be measured which are smaller than the smallest divisions of the objective micrometer; secondly, the errors in the proper divi-

sions of the objective micrometer are avoided; and lastly, by this method object and division mark can be seen at the same time in equal distinctness, which ordinarily is not possible with direct measurements, as both are in different planes. Besides mounted specimens can be examined.

In the examination itself, the following is to be recollected: 1st, the lines must cover each other with the greatest possible accuracy, and above all not be at an angle to each other, and particularly with high magnifying power (950–1400), the ocular marks must be between the margin of the marks on the object micrometer and exactly in the middle of its groove. 2d, they must be examined under the same and constant source of illumination; neither diaphragm, nor the mirror, nor the focus must be changed after being once properly adjusted, as by a change in illumination the contours of the marks on the objective micrometer appear laterally displaced. Should a cloud disturb the observer, he should wait till it passes by. 3d, the micrometer screw must not be moved, unless the contours of the division marks cannot be distintly seen, owing to imperfections of the glass surface of the objective micrometer. The differences produced by a change of focus are far greater than one would *a priori* suppose. Even the movement of the observers's eye is a factor to be considered, since first, a change of axis changes the position of the image, and secondly, the refractive media of the eyes of some individuals may not yield the same result in all positions of the same, a remark which may apply even to the otherwise healthy eye.

The eye should be placed as near the eye-piece as possible, and be kept as nearly as possible at the same distance; if the distance is increased, a larger, more diffuse image results, whose lesser clearness is not as appreciable as the deception as to its size, which can be

demonstrated by measurement. I recollect how, in my student days, several students measured a very simple botanical object, and, although all of them were good draughtsmen, differed amongst themselves as to the result far more than the actual size of the object. The lower the magnifying power that can be got along with, the better. Unnecessarily high powers only increase the sources of error.

Since it is simply impossible to obtain *absolutely accurate* measurements, we ought to reduce the sources of error to the greatest possible minimum by adhering to a uniform set of rules.

With light, particularly with shining bodies, larger measurements than the true ones are readily made, owing to the irradiation in vision. It is safer here to measure at the ends of the division marks than between them.

I consider it unwise to change eyes (relieving the tired organ by its fellow) *while* measuring, as this may require a change in the diaphragm or the focus. The two eyes of the same individual require different degrees of light, and according to my experience, this is the rule. In my own case, much less light is necessary for the right than for the left eye, whose ability to recognize and distinguish colors is correspondingly less. Such differences we fail to recognize in the ordinary condition of things altogether.

2. *The Counting of Objects.*

In order to count objects I employ a piece of glass, on which cross-lines are marked at a distance from each other of 1 mm., and which is placed in the eye-piece. Such an apparatus can be easily made from a piece of mica, on which the lines may be traced with a dissecting needle.

For such planimetric computations a similar tabular assistance may be obtained as that described under the pre-

vious heading. This contrivance is equally useful for drawing as for counting, and may be even used, to a certain extent, for measuring. It is advisable to discard the marginal fields as, particularly with high powers, the diverging rays produce diffused images, which always appear larger than the reality and unequally distorted.

3. *The Drawing of Objects.*

Drawing is a species of international speech, intelligible to all, and which even when of the simplest character excels the clearest description in words, when it is intended to convey one's own conception to another without the intervention of a direct observation of the object itself (Harting).

A camera lucida with two prisms is a very convenient apparatus, as image and pencil are seen with equal distinctness. The paper used should not contrast too much with the color of the specimen; other things being equal, it should be of a gray or some other neutral tint, and illuminated to about the same degree as the object and by no means too brilliantly. The sharpened part of the pencil wood which disturbs the eye, through its whiteness, may be darkened with ink. One great mistake often made by draughtsmen is the neglecting to bring the optical image plane in the same plane with the drawing plane, or in an oblique plane; from this neglect, distorted images always result.

4. *Preparation of Specimens.*

In submitting whole brains to the action of preservative fluid, the pia should be partly removed and loosened by tearing, in order to facilitate the penetration of the same. As the brain, when freshly submerged, is apt to flatten out on the lowest face, the parts situated at the latter region should never be employed for examination. Brain tissue,

once hardened, does not undergo any further changes, with a change in the preservative fluids.

For examining the normal brain, animals of moderate size (cats, dogs, guinea pigs or rabbits), who may be drowned in a covered vessel, or trephined and the fresh brain removed. Smaller animals, such as mice, amphibia, and birds, may have the brain removed best with bone scissors, simple scissors, and knives. Brains of larger animals can be obtained fresh in any slaughter house by the investigator himself.

As regards section cutting, it is to be remarked that if the knife is improperly handled, and is not properly wet with alcohol, that lamination of the granules and nuclei or the neuroglia is produced, which is readily recognizable as artificial by its peculiar waves and translocations. Such specimens are of course improper objects for investigation.

The statement may be found frequently repeated, that the cover glass, sinking by its own weight, drives the Canada balsam, dammar varnish, or other substance apart, so that the space between the two glasses is completely filled: This is not correct. I have determined by accurate measurements that the cover glass does not only not press, but that even in specimens completely free from air, the entering fluid lifts it up bodily, and to no slight extent, even when weights, spring-clips, and other compressing devices are employed for days and even weeks. It is only there where the slightest necessary amount of fluid is used that the cover glass is more firmly applied, but not by its own weight, but because of capillary suction. For these reasons it is best, particularly when it is intended to employ the highest powers, to use the least possible quantity of fluid.

For special purposes the *fresh* brain may be examined in:

1. Iodized serum (liquor amnii with iodine).
2. In one-quarter-per-cent solution of chloride of gold.

3. In liquor amnii alone.
4. In aqueous humor.
5. In blood serum.
6. In saliva.
7. In three-quarter-per-cent solution of common salt.
8. In distilled water.

The brain may be hardened for the purpose of making fine sections in :

1. Concentrated bichromate of potash for thirty-six to forty-eight hours, followed by treatment with ordinary alcohol for from six to eight hours, and completed in absolute alcohol or such of at least ninety-eight per cent.

2. Immersion in ordinary alcohol of about thirty per cent, in six to eight hours followed by absolute alcohol for twenty-four to forty-eight hours.

3. Immersion in chromic acid of one to four parts to twenty-five of water for two to three days (inferior to the chromic salts, as it renders the specimen brittle.

4. Immersion in alcohol, supplemented by immersion in a two-per-cent solution of bichromate of potash (Clarke's method).

5. Immersion in a solution of four to eight grains of concentrated sulphuric acid to an ounce of water (this is highly recommended).

For purpose of maceration and teasing the following may be used :

1. Chromic acid (excellent).
2. A ten-per-cent solution of bichromate of potash.
3. Gerlach's method, which I cannot recommend, exposing the tissue for several weeks to the action of a solution of two drops of saturated bichromate of potash solution to the ounce of water.
4. Exposure to the action of a four-per-cent to one-per-cent solution of bichromate of potash for two weeks.

5. To one of two to four drops of concentrated sulphuric acid to the ounce of water for one to four days.

6. One of alcohol to three parts of water for twenty-four to forty-eight hours.

7. One-quarter to one-per-cent solution of bichromate of potash, well calculated, according to Frommann, to isolate epithelia in combination with the neuroglia; surface sections are made, and teasing subsequently resorted to. This method is simple, quick and efficacious.

8. Perosmic acid (one-tenth per cent), maceration for several days; no advantages over other methods.

To isolate vessels from the cortex or pia the following are recommended:

1. Slight maceration in chromic acid.

2. Seizing the vessels in the fresh brain and dragging them out of the pia.

To render the adventitia prominent:

1. Camphor water.

2. Glycerin; both recommended by Batty Tuke.

The following agents are asserted to have a special influence on the granules:

1. Soda lye is said to make a second outer and pale contour visible.

2. Acetic acid is said to render fine granules visible in them.

3. Carmine is said to stain them with even intensity.

4. Weak bichromate of potash solution, it is claimed, gives the smaller granules a peculiar brilliancy.

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ALCOHOLIC INSANITY.[1]

BY

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THE relation which alcohol bears to insanity is both causative and contributive. This fact was emphasized in a discussion on "The Influence of Alcohol in the Causation of Insanity," held by the Psychological Section of the British Medical Association at its annual meeting in 1880.

Dr. J. Crichton Browne, President of the Section, in summing up the results of the discussion, and especially certain statistics presented, said: "There were a certain proportion of cases in which intemperance was an expression of a diseased state already established, and had nothing to do with causation; but, on the other hand, there were certainly included in that large mass of cases at the end (of the statistics) in which the causes of the insanity were unknown, a certain proportion in which secret or concealed or unrecognized drinking was really the undiscovered cause."

He offered a physiological explanation of the action of alcohol on the nervous system, maintaining that it first excited and then paralyzed every nerve centre in succession, beginning on the highest and ending on the lowest, and that its action was not simple, but doubly and trebly compound. The highest inhibitory and controlling centres upon which its primary action was exercised could not be repeatedly paralyzed without grave danger to

[1] Read before the "American Association for the Cure of Inebriates," at its Annual Meeting held April 26th, 1883.

mental integrity—to weaken volition was to promote anarchy in mind.

In evidence taken before a select committee of the House of Commons appointed in 1872 "to inquire into the best plan for the control and management of habitual drunkards," the leading lunacy experts of England, Scotland, and Ireland testified that cases of insanity were directly traceable to alcohol; all agreed that, while alcoholic inebriety may precede, usher in, or accompany the various stages of, and not be directly responsible for the insanity, yet there were cases of insanity due directly to the deteriorating influences of alcohol on the nervous centres, having their own special symptomatology as differentiating them from other forms of insanity, and also requiring special treatment. The authorities differ as to the percentage of cases of insanity from alcohol as compared with cases of insanity from other causes, some placing it as low as ten per cent, others as high as nineteen per cent, the average being about fifteen per cent. In an analysis of one thousand cases of insanity from all causes, Dr. Browne found that fifteen per cent were directly due to alcohol. Dr. Edgar Shepherd,[1] of Colney Hatch (an insane retreat in England) is of the opinion that, either directly or indirectly, forty per cent of British insanity springs from intemperance. In a study of six hundred cases of inebriety treated at the Inebriate Asylum, Fort Hamilton, I found that one hundred and sixty-six persons had three hundred and nine attacks of alcoholic mania in some form at various times during their periods of alcoholic addiction. In the annual report of the New York State Lunatic Asylum for 1883, of the four hundred and twelve cases tabulated, in thirty-two, or in a little less than one in thirteen "intemperance" was stated as the exciting cause.

[1] Med. Chirurg. Jour., p. 141.

Without considering in detail all the different conditions or types of insanity with which alcoholism may be associated, suffice it to say that alcoholism can precede or co-exist with most of, if not all, of the various phases of insanity either in a causative or contributive relation, and moreover develops forms peculiarly its own of mental alienation. Much confusion results from the misapplication of the various terms used to describe the different abnormal mental conditions to which alcohol may give rise.

It is therefore our purpose, while alluding simply to the more common, and, therefore, better understood forms, to dwell at length on those conditions of "alcoholic insanity," not so well known, and especially the differential diagnosis of these conditions, and we divide them for convenience of consideration into the acute and chronic forms. The acute are:

1. Acute alcoholic mania, or *mania à potu.*
2. Acute alcoholic delirium, or delirium tremens.
3. Alcoholic epileptiform mania.

The chronic forms are:

1. Chronic alcoholic mania—maniacal type—homicidal tendencies.
2. Chronic alcoholic melancholia—suicidal tendencies.
3. Alcoholic dementia.
4. Dipsomania or oinomania. And, finally, we shall consider "chronic alcoholism," a condition that may co-exist with any type of "alcoholic insanity," and is analogous to forms of chronic poisoning from other substances, as lead, tobacco, etc.

Acute alcoholic mania. Mania à potu is a common synonym for this condition. It does not occur in habitual drunkards, but in persons who are not, as a rule, intemperate, yet occasionally drink to excess, as a matter of

their social environments, or it may manifest itself in the periodic inebriate or occasional drunkard. The paroxysm or frenzy is developed in the midst of a debauch, suddenly, without warning. The subjects of such an attack make assaults on those around them; their will-power is dethroned; they are veritable maniacs; they are violently aggressive; their tendencies are markedly homicidal; "retaining sufficient nervous power to wield their limbs, yet not sufficient to guide their reason, they become dangerous alcoholic criminals."[1]

Why some persons can drink to excess, and are not thus affected, and others cannot do so without becoming maniacal, is probably due to the fact that the latter class, either from their natural temperaments or from some cerebral defect, are readily crazed by alcohol or rendered "liquor mad." Indeed, Anstie affirms that in all the cases of this class that he has seen there was a hereditary predisposition to insanity.

The paroxysm or fit of mania usually passes off in a comparatively short time, a few hours at the furthest. In exceptional instances, the person may remain maniacal for four or five days after a drinking bout; but in these cases, as Anstie has shown, there is a condition of alcoholic phrenitis or inflammatory delirium, with marked vascular excitement and high temperature, requiring prompt antiphlogistic measures. The attack passes off by the occurrence of vomiting and copious diaphoresis, and the stage of excitement may be succeeded by one of stupor and prolonged slumber. Finally the alcohol is sufficiently eliminated from his system to permit his normal cerebral action to be restored. When told of what he has done (for he is unconscious of his acts during the paroxysm), he is usually extremely sorry, ashamed, and repentant. If a periodical inebriate, at some future period he again

[1] Richardson.

becomes intoxicated, and the result is the same, and continues to be so until some accident or illness—the result of his debauch—has a fatal termination, or some criminal act places him in the prison or the asylum, if he is adjudged a proper subject for the latter place.

The following case occurred in my experience. The person was a United States Contractor and at times received large sums of money from the government. He was an occasional inebriate; during the period of his debauches, he was very violent, dangerous to his wife and those about him, making assaults on every one. After the paroxysms of mania passed off, he was repentant, extremely grieved, and did all in his power to amend the evil he had done. After one of his fits of intemperance, in a mood of repentance, he sought to conciliate his wife by the expenditure of a large sum of money. He rented a villa on the Hudson, furnished it extravagantly, bought horses and carriages, and employed a retinue of servants, and in every way strove to make restitution for his past misdeeds. Some time after this—though not a lengthy period—he received a large sum of money from the government, and again went on one of his debauches, returning home a mad man. He procured an ax; his wife fled at his approach and locked herself in a room at the top of the house; the servants escaped to a neighbor's. The maniac had full control of the premises, and proceeded to demolish the furniture. A grand Steinway piano was reduced to splinters, and ruin spread in every direction as his insane fury dictated. Fortunately, he met no one, or homicide would most certainly have been added to his acts of destruction. His wife eventually procured a divorce, and he died in an asylum. His son became an inebriate, and coming under my care, I was enabled to obtain the family history.

The son was a periodical inebriate, and, when under the influence of alcohol, was, like his father, a maniac, ag-

gressive, homicidal, and with exceedingly dangerous and destructive tendencies.

There is no crime in the calendar that these alcoholic maniacs may not commit. Their reason is temporarily dethroned; they are unconscious of not the character of their actions alone, but the acts themselves, and are therefore irresponsible.

One marked characteristic of this form of mania is that it is not preceded or followed by delusions or hallucinations, as other forms of alcoholic insanity are. The assaults are apparently motiveless, the frenzy cyclonic in the shortness of its duration and in its oftentimes terrible results.

The following remarkable case[1] shows the complete annihilation of all mental and moral responsibility. A young man in Madison county, in this State, in the year 1859 was attacked with alcoholic delirium for the third time. While under the attack, he killed his father and mother, cut out their hearts, which he roasted and ate. He was arrested, thrown into prison, and indicted for murder. He was brought into court for trial, where Judge Gray, of the Supreme Court, stated that the case could not be tried, as "there was no motive to prompt a man to commit such a crime." The man was sent to an insane asylum.

Another characteristic of alcoholic mania is that the natural strength of the person may be greatly increased, and a man of ordinary physical development may thus become a giant, in his alcoholic fury, and woe be to those who would stand in his way, or thwart his purpose. His tendencies are not in the more cunning forms of lunacy, nor apparently preceded or guided by any motive—they are aggressive and homicidal.

Imbeciles, harmless when uninfluenced by alcohol, be-

[1] Fourth Annual Report of New York State Ineb. Asylum, 1866, Dr. J. Edward Turner, Superintendent.

come most dangerous maniacs when affected by it. But there is no form of mania more dangerous than that which occurs in the epileptic when influenced by alcohol; it matters not whether his epilepsy be directly due to alcohol or to other causes. According to Magnan, he is one of the most dangerous of patients: "he adds to the impulses, sometimes so terrible, to which he is subject from his disease, those which he draws from his intoxication."

We now pass to the consideration of the more common and generally better understood form of alcoholic mental alienation, acute alcoholic delirium, or delirium tremens, the latter synonym being often a misnomer, as tremor is not infrequently absent.

This condition presents itself in one of three forms.

First, a simple, uncomplicated, non-febrile form, the patient recovering readily after a few days' illness, with little or no treatment, and after a short period of convalescence resuming his usual occupation.

Second, a form similar to that already described, with the exception that the convalescence is slow, delusions persistent, and relapses or recurrences of the attack, at comparatively short intervals, are common. The tendency of this type of delirium tremens is to drift into the more chronic forms of alcoholic mania.

Third, a febrile form, with a pulse from 100 to 140, a variable and rising temperature, and other symptoms of a grave nature occurring in rapid sequence, a fatal termination not unfrequently resulting in a few days. This condition is known as "Febrile Delirium Tremens." [1]

The delirium is characterized by hallucinations of sight and hearing, and even those of taste and smell.

Amblyopia, according to Magnan, may exist, and even the chromatic power of the eye, it is asserted by some,

[1] Anstie finds that the tracing of the sphygmograph gives forms of pulse-waves similar to forms of a typhoid type, exhibiting that condition known as dicrotism.

may be affected. Hence the conditions for optical delusions are present, and these are readily misconstrued by a disordered intellect into all kinds of forms and fantasies, horrible or grotesque. There is perversion of the hearing, and natural sounds receive undue importance, and are readily misinterpreted by the delirious patient. There is less perversion of taste and smell than of the other senses; but the fact that the former may be perverted is of interest, as accounting, in some measure, for the delusion of poisoning so common in the more subacute and chronic forms of alcoholic mania.

The delirium is characterized by great changeableness of delusions, although there is one delusion of fixed prominence to which all others are secondary. The perversion of the various senses form, or change, or direct the character of the delusions, which are accompanied by hallucinations of hearing, vision, and tactile sensation. Ordinary sounds receive undue importance, or are converted into terrible threats, the air is full of voices, visions constantly appear and disappear. Commonplace objects assume the form of demons or other horrid objects. Hyperæsthesia of the skin, perverted tactile sensation, gives the belief that bugs are crawling over the integument. Irregular chilly sensation and formication, or pricking sensations, are easily converted by the delirious patient into snakes, rats, or other vermin. The patient borrows his delusions largely from his surroundings, although all authorities agree that the avocation of the patient, or the last prominent act he may have engaged in, establish the central delusion of his delirium.

The actions of patients are often a perfect piece of pantomime; the tailor will thread an imaginary needle, and stitch an imaginary piece of cloth; and so others will follow their ordinary avocations. There is an incessant, monkey-like action; the patient is extremely loquacious,

and continually inspecting his room, or bed-clothing, or the dress of those about him.

If his delusion partakes largely of personal danger, he makes repeated attempts to escape, and often effects his purpose with great cunning.

He will assault those about him in his attempts to get away, or if he imagines they are his enemies. These acts of violence are generally seen in the more maniacal form of delirium. Delusions of a melancholic character are not unfrequently present; preparations are being made for his funeral, the table is a bier, the sheets are his shroud; or he is to be drowned, or hung, or terribly abused in some way; he begs for mercy, he prays for deliverance, and in a paroxysm of terror may commit suicide, if not closely watched.

Finally, either from successful medication or the natural termination of the case, the excessive restlessness—the "busy delirium"—the protracted insomnia give place to sleep. If the case ends favorably, a marked improvement follows, the patient awakes refreshed, although not always free from his delusions, and his convalescence is more or less rapid; or he may pass into a semi-comatose condition, and from thence into complete coma, and finally death; the final issue of the case being largely determined beforehand by the fact whether we are dealing with a case of febrile or non-febrile delirium. It is well to be aware that collapse has occurred suddenly, as the case was in progress, without any premonitory symptoms, a fatal issue resulting rapidly.

I have thus briefly alluded to the more acute forms of alcoholic mania, and more especially dwelling on the mental conditions, that I might more intelligently present and dwell at length upon the more chronic forms of alcoholic mania, and have the advantage which comparison affords.

As far as the clinical history and symptomatology of the

more chronic forms of alcoholic mania are concerned, I will quote the description as given by Maudsley:

"Delirium tremens might be described justly as an acute alcoholism, since there is a chronic alcoholism which is characterized by the slow and gradual development of similar symptoms; in truth a chronic delirium tremens which is called the insanity of alcoholism. Premonitory of it is the same sleeplessness, the same motor restlessness, the same nausea and want of appetite, that go before delirium tremens. Instead, however, of the rapidly rising excitement, the changing hallucinations and delirious incoherence then following, there is great mental disquietude with morbid suspicions or actual delusions of wrong intended or done against him, of wilful provocations and persecutions by neighbors, of thieves about his premises, of unfaithfulness on the part of his wife, and the like; suspicions which are frequently attended with such hallucinations of hearing, of sight, of tactile sensation, as threatening voices heard, insulting gestures or mysterious signs seen, electrical agencies felt. In this state a violent-tempered man, resolved to be even with the scoundrels whom he declares to be persecuting him, sometimes does sad deeds of violence. His hallucinations disappear first in the daytime, being as bad as ever, perhaps, during the night; then they are less vivid at night, being most marked in the stage between sleeping and waking. Next, they are no more than bad dreams or nightmares, and at last they go entirely." The author continues, "unfortunately the recovery seldom lasts, inasmuch as the patient goes back to his indulgence as soon as he can, the chances are that he has other attacks, and that in the end his mind is permanently impaired, his memory is so damaged, perhaps, that it has no more hold of recent impressions than that of one who suffers from senile dementia; his understanding is enfeebled, and even childish; his moral sense is blunted or

destroyed, so that he loses all feeling of moral responsibility, and becomes cunning, cowardly, untruthful, untrustworthy, and his will is so deteriorated, that he has not the least control over himself in respect to indulgence in drink.

"Muscular unsteadiness and trembling go with these signs of increasing mental debility, and there is oftentimes sensory dulness, or actual sensory and motor paralysis of the limbs, on which account he cannot hold firmly with them, perhaps dropping helplessly what he takes in his hands, or lies in bed because he cannot use his legs to walk. . . .

"This condition of mental impairment may be brought about gradually by a steadily continued course of excessive drinking, in some persons, especially women, without any of the hallucinations and delusions of persecutions that go before it in other cases. At a later and worse stage, the patient is completely demented, his mind being thoroughly disorganized, as for example that the most extraordinary scenes occur in his room; that knives and broken glass are coming out of his flesh and skin; that people cut up his body and carry him away at night. The mental deterioration being so great that he resembles not a little in mental symptoms a person who is in the last stages of senile dementia. . . .

"The insanity produced by alcohol is instructive, for it exhibits in more rapid sequence a train of symptoms very like those of ordinary idiopathic insanity, so-called, and exhibits them in a case where we can clearly trace the operation of a cause. We know of a certainty that the alcohol is absorbed into the blood; that it is carried by it to the brain, and that it acts there directly upon the nervous tissues, from which it has been taken in quantity. Its first effect is to stimulate the tissues and cause increase of activity; but in the end it produces degeneration of tissue

and destruction of functions. Let it be noted, too, that it acts equally perniciously upon the different nervous centres, motor, vaso-motor, sensory, and ideational, the collective symptoms of this impartial action giving its peculiar physiognomy to alcoholic insanity."

We have made this extensive quotation, because it is the testimony of an eminent observer on mental diseases, and because it is the experience not alone of himself, but of Anstie, Magnan, and other experts in this field of medicine. It coincides also with my experience as far as opportunity has been afforded me to study this form of insanity in our asylum.

The predisposing cause of the more chronic forms of alcoholic mania, or "alcoholic insanity," then is found in the degenerative changes which alcohol has produced in the cerebral nervous and vascular tissues—a degeneration that is the result of a long-continued and excessive use of alcoholic stimulants. I am aware that cases of insanity have been recorded by Tuke, Magnan, and Bucknill, when the first excess in alcohol was followed by insanity lasting for many months, and in some instances years, but it seems to me that in these cases the alcohol must be regarded as contributive, not causative; under such circumstances, simply the exciting cause of a latent condition.

The exciting cause is generally a debauch which ushers in the attack, or the insanity may be developed more insidiously, apparently without any precursory signs; the first manifestations having the peculiar mental symptoms that characterize this condition. If, however, the attack follows a debauch, we have certain symptoms that precede the delusions, insomnia, variable temperature and pulse, poor appetite, restlessness, the general condition of a febrile state; an attack of "acute alcoholic delirium" may now supervene, with the delusions and hallucination which we

have described. As these symptoms subside and the conditions of the patient approaches the normal, we do not have that return to mental health that occurs with reasonable promptitude after a simple attack of delirium tremens; in other words the mental state of the patient does not improve with his physical condition; as a rule, one central delusion remains, around which others of secondary importance cluster. I need not allude to the character of these delusions; they have been already referred to, except that, in addition to the delusions as to persecution, or the monomania of suspicion, we have that of delusions as to locality, the patient imagining that he is in some place other than the asylum, or his place of present abode, also that he visits places or goes to town regularly, whereas he does not leave his house or the asylum.

Chronic alcoholic mania may be divided into two forms. Both are characterized by the monomania of suspicion or of persecution; in one class of cases, the maniacal and homicidal type is presented; in the other, the melancholic and suicidal form.

The former is one of the most dangerous types of mania that is met with, especially when the mental lienation is not ushered in or accompanied by a febrile condition, or other symptoms that usually point out a departure from health. He is therefore not regarded as a sick man by his friends, although they may think he acts a little "queer," he is moody, taciturn, he whispers his suspicions, he picks out his special enemies, he prepares himself against assault, carries weapons on his person, or conceals them in a secret place, he broods over his fancied wrongs; finally, times and place suit his purpose, the revengeful design he has been nursing for months and hinting about to his immediate acquaintances now finds an outlet, and the press publishes a case of "murder in cold blood;" his history by degrees comes out, experts are summoned, his

true condition is ascertained, and he is sent to an asylum. One very common delusion is that of marital unfaithfulness; some one, generally a near acquaintance who is on visiting terms with his family, is selected as the one who has destroyed the sanctity of his hearth and home. Too often his insane delusions are treated as simply jealousy, but it is a morbid jealousy of the most intense character and will in its insane fury take the life of some innocent victim. It is a good rule not to take the homicidal vagaries of an intemperate man as a matter of trifling importance, but when he breathes out, it may be threatening and slaughter, although it may be in an undertone, let him be promptly arrested and examined as to his sanity. Whether the monomania of persecution in alcoholics be developed with or without febrile symptoms, this class of cases is extremely dangerous, and in or out of an asylum must be under constant watch and carefully guarded; their tendencies are homicidal.

Dr. J. C. Lester has furnished me with the notes of the following case:—The patient is forty-three years of age. has been drinking to excess for several years past, became insane; the insanity was the direct result of his excessive use of alcohol, there being no hereditary taint. His grandparents lived to be over ninety years of age. His parents are now living, his father is seventy-nine years old, his mother seventy-five years, and are exemplary people in every respect. His insanity lasted about a year, he recovered sufficiently to resume his business, he remained perfectly sober for several months only to relapse, and is now drinking as hard as ever. The immediate cause of the relapse was a severely sprained ankle, from which he suffered very much. His insanity at all times is that of the monomania of suspicion or persecution. His suspicions are m inly directed towards his wife and child. He walks about the house, and if he had his full liberty would no

doubt assault them, for it was found, before his condition was fully ascertained, that he had concealed, under the stationary wash-stand of the bed-room occupied by himself and his wife, a dirk knife which was covered with some old clothes.

This class of patients show great ingenuity and cunning, combined with secretiveness, in carrying out their designs.

The following case was reported by Dr. Drake, of Cincinnati, Ohio, and was published in the report of New York State Inebriate Asylum, for 1866, Dr. J. E. Turner, superintendent. At the time of the occurrence it attracted the attention of the medical public in its bearings on the legal responsibility of the dipsomaniac.

"John Birdsall, of Harrison, in that State, was indicted, in 1829, for the murder of his wife with an axe, by dividing the spinal column in the neck. He was about fifty years old, and had been married to this, his second wife, about nineteen or twenty years, and had children by her. For some years previous, he had been subject to occasional fits of intoxication. These, of late, were followed by delirium tremens, which generally lasted several days, and went off spontaneously. In these paroxysms, all its physical and moral symptoms were present. He entertained great fears for his safety, and sometimes ran about the village as if attempting to escape from pursuit. At another time, he concealed himself between a feather and straw bed, in his own house. He would point his gun from his window, as if for defense against imaginary persons. He was also very watchful. The prevailing maniacal delusion was, that his wife was in combination with his neighbors—one, his son by his first wife—against his life. He had charged her during his paroxysms with criminal intimacy with these, and had threatened to kill her.

"On Sunday he was intoxicated, Monday, Tuesday, and

Wednesday presented nothing special. On Wednesday evening he complained of being unwell, but seemed to be rational. He slept none that night, and next day the family thought him crazy, but were not alarmed. In the course of it, he took an axe and went to a neighbor, whom he desired to return with him, as he stated they wanted to kill him. He spent the day at home, apparently in terror and agitation; manifested jealousy of his wife; barred the doors; and fancied that the persons of whom he was jealous were manufacturing ropes up-stairs to hang him.

"In the course of the afternoon he suddenly committed the murder. His wife was sitting by the fire, and he had been walking the room. After the fatal blow on the neck, he followed it by two or three on the face. His eldest daughter seized the axe, which he yielded, when he took a scythe and attempted to strike her. She defended herself until the door was opened. When arrested, he acknowledged the homicide, and knew, he said, that he would be hung, but ought to have done it sooner. He talked at this time so rationally that many of the witnesses could not believe him deranged. He evinced no dread of punishment, but was still in great apprehension of those who he had believed intended to kill him. After being committed, he became regular, and expressed sorrow for what he had done.

"On the trial, three medical witnesses agreed that he labored under *mania à potu* when he committed the homicide. For the defense, it was urged that when drunkenness gives rise to insanity it should cause immunity, and hence form a legal excuse. On the other hand, the counsel for the people remarked that Birdsall knew that this delirium followed his intoxication, and hence it was voluntary. The law, therefore, held him accountable for actions during such a state. The verdict was murder in the first degree, and he was sentenced to death."

A case has been under my observation in which during the last thirteen years there have been some twenty-five or thirty attacks of alcoholic mania, more or less protracted. In all of these attacks, the monomania of suspicion was very marked, the main delusion being that his wife was unfaithful to him. In all his attacks of mania he was dangerous to those about him, and had to be kept under restraint. I have no doubt if he had had the opportunity, he would have assaulted his wife. The other form of chronic alcoholic mania is characterized by melancholia. The patient is depressed, weeps readily, to a certain extent he is confidential, seems to crave sympathy. He will follow you about, and ask your aid against supposed evils that are impending over him. I recall one case where the patient believed that his funeral would take place in a few hours. He could hear people preparing for it; he begged me to delay, if possible, the ceremony; he was exceedingly sorrowful and depressed. The delusions are various; persons dead are living, and the living are dead. Events that have happened long since are being re-enacted. Delusions as to locality, as I have said, are often marked. The delusion of poison in the food or drink is oftentimes a very troublesome one. Such persons, however, will take ale or other stimulants when they refuse food, a perversion of taste being the probable cause of this form of delusion we have referred to. This delusion is usually subsidiary to more prominent or leading mental aberrations. The central or prominent delusion is the first to come, the last to leave. As his disordered intellect rights itself, he clings to this oftentimes persistently, and finally, when his reasoning powers return, he listens to argument, and gives up his delusions as a fallacy. It is a curious fact, as in the case we have mentioned, that in subsequent attacks or relapses the

same delusions so prominent in previous attacks return, and remain with the same persistency.

The differential diagnosis between chronic alcoholic mania and the more acute forms of alcoholism, and the idiopathic forms of insanity, or insanity from other causes than alcohol, should exclude delirium tremens, or acute alcoholic delirium, general paresis in its earlier stage, and insanity from syphilis, or traumatism associated with alcoholism.

We have dwelt at length upon the train of mental symptoms in delirium tremens, the great variety and variableness of the delusions, the persistent insomnia, great restlessness, incessant loquacity of the patient, those symptoms best covered and expressed by the term "busy delirium." This, with the comparatively *short duration* of the attack, exhibits a marked contrast to the more chronic form. In alcoholic insanity, sleep will take the place of the "painful vigils" so characteristic of delirium tremens. The monomania of the delusions is characteristic of the more chronic form as compared with the variety and variableness of the more acute forms and the vascular or febrile excitement. He is the subject of delusions, not of delirium—Dr. Skae and others make this distinction.

We have thus drawn the distinction between the characteristic "busy delirium" of delirium tremens and the delusions and less marked vascular excitement of chronic alcoholic mania, because this, with the comparatively short duration of the former and the protracted duration of the latter, constitute the principal features in the differential diagnosis. Cases of general paresis in the incipient stages are not unfrequently characterized by fits of intoxication, and to differentiate this from the condition under consideration, especially if preceded by an alcoholic history, involves some difficulty. However, as pointed out by Anstie and others, the characteristic feature of

"mental exaltation," which marks general paresis and tinctures the delusions, is wanting in simple alcoholic insanity; in the latter instances, depression, with morbid forebodings, or the monomania of suspicion, being the marked peculiarity. In those rare instances of general paresis where mental exaltation is not a feature, the absence of other symptoms that pertain to alcoholism will clear up the diagnosis. Again, alcoholism, with repeated attacks of alcoholic insanity, may eventually terminate in general paresis, and in these cases alcohol may have two important bearings from a medico-legal standing—whether it was causative or simply contributive.

Dr. L. C. Gray informs me that he has found that in the earlier stages of alcoholic paresis the ideas of grandeur, etc., are more logical, the patient giving a reason for his grand ideas, whereas in idiopathic paresis the patient is stupid, dull, and illogical when questioned as to his delusions.

Alcoholism may be associated with insanity from other causes, as syphilis or blows on the head. In the report of cases already alluded to, one case in four had had syphilis, and one case in six had received some form of head injury. In such cases, it will be our duty to determine whether the relation of the alcoholism to the insanity is causative or simply contributive. It is enough for us to know that alcoholic intoxication is not unfrequently the first or initial symptom of an insanity not directly due to alcohol, and thus establish our treatment and qualify our prognosis in a proper way.

In the consideration of the various types of alcoholic mania, it will be necessary to allude at least to dipsomania or oinomania. Magnan refers to it as "a peculiar form of instinctive monomania." It is an irresistible impulse that drives a person to alcoholic intoxication at stated or irregular periods. The attack is preceded by a condition

of melancholia, anorexia, insomnia, and general restlessness. After the debauch, or during it, the special effects of the alcohol on the mental and physical condition become manifest — tremor, hallucinations, sleeplessness, coated tongue, loss of appetite, and other symptoms of gastric derangement. The "irresistible impulse" is the characteristic feature of this special form of monomania. The genesis of that impulse, and the views of various writers as to its pathological origin, the province of this paper will not permit to touch.

The point to be made here is, that the hallucinations and delusions are simply the result of the alcoholic poisoning.

The person again and again yields to the insane impulse until death, either by some intercurrent disease, or disease resulting from his alcoholic excesses, relieves him from his sad heritage.

Chronic alcoholism or chronic alcoholic intoxication is a condition analogous to poisoning by other substances, as lead, tobacco, etc. It is thus defined by Magnus Huss: "The name *chronic alcoholism* applies to the collective symptoms of a disordered condition of the mental, motor, and sensory functions of the nervous system, these symptoms assuming a chronic form, and without their being immediately connected with any of these (organic) modifications of the central or peripheric portions of the nervous system, which may be detected during life or discovered after death by ocular inspection; such symptoms, moreover, affecting individuals who have persisted for a considerable length of time in the abuse of alcoholic liquors."[1]

These symptoms are insomnia, attacks of giddiness, headache, tinnitus aurium; hallucinations, especially of vision, muscæ volitantes; muscular weakness and trem-

[1] Chronic Alcoholic Intoxication (Marcel).

bling, especially in the lower extremities; tremor being marked in the tongue; attacks of dyspnœa, sense of choking or suffocation, due to a spasm of glottis; in cases of profound alcoholic coma, paralysis of the glottis, with complete collapse, has followed, and tracheotomy[1] has been performed to prevent death by suffocation. Hyperæsthesia of integument, formication, pricking or stinging sensations; anæsthesia,[2] especially of lower extremities; delusions may exist, but they are feebler than in delirium tremens, and there is this marked feature, the patient is conscious of his hallucinations and illusions, and admits them, and is not prejudiced by them.

It is important to speak of chronic alcoholism in this connection, because all the effects of chronic poisoning by alcohol may co-exist, in whole or in part, with all the various forms of mental deterioration, in the production of which alcohol is a factor. Having a knowledge of the various symptoms of chronic alcoholism, we can readily distinguish them, and treat them independently of the co-existing mental conditions.

We have thus reviewed the more prominent types of insanity with which alcoholism is associated either in a causative or contributive relation. Our future remarks in reference to the prognosis and treatment will be confined to chronic alcoholic mania.

The prognosis includes the duration of the attack, the possible restoration, or not, of the patient to mental as well as physical health, and the probability of a relapse.

The duration will depend upon the dietetic, hygienic, and medicinal conditions to which we subject the patient. I believe that under improper treatment, and for the want of proper treatment, an attack may be indefinitely pro-

[1] Medico-Chirurgical Transactions, 1837. Geo. Sampson, Esq.— Marcel, Chronic Alcoholic Intoxication.

[2] "Alcoholic Anæsthesia," with cases.—Mason, 1881.

longed, and eventually lapse into incurable insanity. The period, even under favorable conditions, will vary from a few weeks to several months, and Blandford reports a case where two years elapsed before recovery took place. This form of insanity, I believe, has no special period of self-limitation. The tendency to chronicity is very marked, and under unfavorable conditions the insanity may continue indefinitely.

The prognosis as to the final recovery of the patient from his present attack is, as a rule, favorable, more especially if it is not ante-dated by many similar attacks, and it is very surprising and satisfactory how often, in a comparatively short time, the patient may recover his mental as well as physical health under proper treatment.

On the other hand, if there is a history of many similar attacks or periods of insanity, and especially if there is evidence of serious organic changes of the nervous system, the prognosis becomes exceedingly grave, and should the patient survive his present attack, he will probably drift into that form of incurable insanity in which, as Maudsley says, "the mental deterioration is so great that he resembles not a little in mental symptoms a person who is in the last stages of senile dementia."

However favorable our prognosis may be, it should always include the possibility not only, but the great probability of a relapse, so that while we may encourage the friends to look for a recovery in the earlier attacks, our prognosis for the future cannot be favorable. When once insanity has resulted from alcohol, the tendency to relapse is very great; we are dealing with persons whose volition is weakened by previous attacks, and also with every relapse are slowly but surely approaching that inevitable and incurable condition, complete alcoholic dementia; indeed, according to the authorities, this condition in alcoholics may be developed quite suddenly, without pre-

ceding illness, excitement, or sleeplessness, or attacks of acute alcoholic delirium. How many periods of alcoholic mania may precede that which terminates in the incurable form of dementia is not definite; I now have a case under observation for the last thirteen years, during which time the patient has been either in the inebriate or the insane asylum some twenty-five or thirty times, at various periods, for attacks of alcoholic mania. The cause of his dipsomania was a sunstroke; his attacks of drinking came at intervals varying twenty-two days, the shortest, to several months, the longe s all his attacks of dipsomania were followed by alcoholic mania, always more or less chronic, varying from twenty-eight days, the shortest, to sixty-one days, the longest period of duration. He is doing well at the present time, May, 1883, and has not had a relapse for several months.

But our prognosis will not end with our opinion as to the recovery from his present condition or not, nor as to our forecast of his future state. His friends will desire to know what his relation to social and commercial circles should be if he recovers from his present condition, and we should be candid, for upon our opinion may rest most important results, both to the patient and those about him. I think the view of all who have ever had such cases to deal with is not to place them in any position of responsibility or trust, at least not until a long probationary period has passed, because the mere act of so doing would be apt to precipitate them, through mental anxiety and a sense of responsibility they cannot feel equal to, into a relapse. Therefore, should such cases be ever restored sufficiently to again enter commercial or social life, it should be only in a secondary position, more or less under the constant espionage of friends. But even such a case would be an exception to the rule; the majority, the large majority of these cases continue to relapse, until death relieves them

from their hapless condition; or they become ranked among the chronic insane, and are immured the rest of their lives in an asylum.

The *treatment* of alcoholic insanity (we are now considering the more chronic forms) may resolve itself into place of treatment, method of treatment, including proper restraint, medicinal, dietetic, and hygienic measures, and, finally, time of treatment.

As to the first, place of treatment; we have to choose between the home of the patient, the lunatic aylum, or the inebriate asylum; as to the former, we may exclude that as a most improper place, even under the most favorable surroundings. As regards the lunatic asylum, while eminently a proper place as regards treatment, the difficulty would be, while committing the patient as a lunatic, to retain him after his mental condition is recovered, whereas in an inebriate asylum he could be recommitted at the end of a regular period of committal on the ground of habitual or periodical drunkenness, and thus held an indefinite length of time, until all reasonable danger of relapse from too early dismissal from the asylum might result, although completely restored as to his mental condition. In addition to this, a very important advantage, the inebriate asylum has all the advantages that pertain to the insane asylum, as regards restraint, skilled nursing experienced medical officers.

The method of treatment will include the use of alcoholic stimulants. Whether or not these shall be used will depend much on each individual case; some may be very much benefited by the use of stimulants, and others positively harmed. As a rule, I have found that when stimulants are indicated, the malt liquors are preferable to spirituous liquor. Bass' ale, Guinness' stout, or lager-beer when a milder form is required.[1] The value of the malt

[1] The following is an analysis of the various London ales, by A. N. Church,

liquors, in addition to their greater food properties, is due to their moderately stimulating qualities combined with marked sedative or even hypnotic properties. The quantity as well as the form of the stimulant used, and whether or not it is to be used, each case must determine for itself. The bulk of the malt liquor, or its tendency to produce vomiting or diarrhœa may, in some cases, interdict its use.

As regards diet; nourishing, easily assimilated food must be given, recollecting that, as a class, these patients suffer from mal-nutrition, and that the channels through which we propose to introduce food into the system are oftentimes fitted very improperly to do their work. The gastric and hepatic functions are sluggish and defective, and will require assistance in the form of proper medication and properly prepared food.

It is needless to add that all co-existing diatheses—malarial, syphilitic, or tubercular—should receive the special treatment indicated for such conditions.

Before considering further the various methods of medication, I wish to dwell at length on the use of the bromides and chloral in persons addicted to alcohol, but more especially to the class under consideration. Personally, I believe we have in the bromides a powerful agent for evil as well as good, and I question whether or not (and I wish to lay stress on this point) the too free use of the bromides in large doses in the acute forms of alcoholic

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A.M., professor of chemistry in the Agricultural College, Cirencester. In each imperial pint (20 ozs.) or quart bottle so called:

	ALCOHOL.	
	OZS.	GRS.
London Stout	1.	74.
London Porter	1.	10.
Pale Ale	1.	12.
Strong Ale	2.	18.

The above analysis appears in the South Kensington Science Book, and is quoted by Charles R. Francis, M.B., in an article published in the London Medical Temperance Journal for April, 1883.

mania may not, while it modifies the acute symptoms, bring about or direct the patient into the more chronic forms of alcoholic insanity. As to the mental effect of so-called "late bromization," or bromism, we know that large and repeated doses of the bromides are very depressing, producing temporary loss of speech, blindness, loss of muscular power and co-ordination; inability, therefore, to stand or walk. In fact, by an injudicious use of the drug we can reduce a person to the condition of a slobbering dement. Ribot[1] reports the case of a clergyman who took the bromides in free doses for insomnia, the result being he lost his memory completely; this faculty, however, returned when the drug was suspended. A late writer says: "There is no question that cases of bromization are now and then mistaken for insanity."

Now if the symptoms as stated have been the direct result of experiment on strong healthy persons, and we are so informed, what could be rationally expected the effect would be on the nervous system of the alcoholic, broken down by disease and dissipation?

It is well to be aware that bromism produces a species of insanity in order that we may intelligently consider such a result as probable in the case before us. As regards hydrate of chloral, I am glad to say that while I witnessed its birth into the therapeutic world, I have also witnessed the gradual retraction of this powerful and uncertain drug into a more limited sphere. If used at all in cases of alcoholism, let it be used in the smallest possible dose that will answer, and with the greatest circumspection, lest we produce cardiac paralysis in a heart already enfeebled by fatty degeneration. Besides its oftentimes direct and lethal action on the organ of circulation, we should not forget its peculiar effect on the mind, due to its degenerative action

[1] Ribot: Diseases of Memory.

on the nervous system when given even in moderate doses for a long period—a train of mental symptoms that is involved in that condition known as the chloral habit. Occasionally we see this condition associated with alcoholism.

But while we may lay aside, at least after the more acute symptoms have subsided, these two remedies in the treatment of alcoholic insanity, we can find not only safe but efficient substitutes well adapted for the anæmic condition of the more chronic forms. In the judicious use of ale or stout we can oftentimes procure a safe slumber for a patient, to which, in some cases of extreme restlessness, a few minims of morphine with digitalis may be added.

Zinc in some form, especially the oxide of zinc, has been shown to be of great value in chronic alcoholism, and has proved useful in my hands in chronic alcoholic mania. It is a safe and efficient sedative to the arterial and nervous systems, also to the gastric mucous membrane in moderate doses; it has tonic as well as hypnotic properties, and is almost a specific, as has been said, in certain forms of chronic alcoholism. According to Marcet, who first called attention to its value in chronic alcoholism, the dose will vary from two to four or even six grains twice a day, suspended in mucilage of gum acacia and given after eating; being tasteless, it is readily taken by the patient and can be mixed with his solid or fluid nourishment. It is a curious fact that chronic poisoning from oxide of zinc resembles in its symptoms the features of chronic alcoholism. Anstie has not found the drug of as much value as reputed. It certainly is not successful in all cases, nor at all stages of any one case, but I believe much depends upon the time at which we use it. We should select for its exhibition the time when the malady has developed some tendency towards chronicity rather than at the inception of an attack. We have also at our command remedies that act directly

upon the vaso-motor system and thus indirectly upon the cerebral circulation.

Tincture nuc. vomicæ or strychnine [1] and fluid ext. ergot, these, by their tonic and contractile effects upon the arterioles and capillaries of the brain, tend to overcome that passive stasis due to vaso-motor paralysis that some writers regard as the pathological condition of the cerebrum in this state.

Tinct. of digitalis or the infusion in moderate doses sufficient to regulate the heart's action does much to establish a better cerebral circulation and is much safer than other forms of cardiac sedatives.

As the patient passes towards convalescence, the various nerve tonics, in the form of strychnine, iron, phosphorus, and the vegetable bitter tonics may be exhibited with advantage.

As soon as possible, out-door exercise should be permitted, and, under the care of a nurse, the patient should walk a certain time in the open air, a favorable day being chosen. Private grounds or a park should be selected, as the exposure of the patient to any unpleasant sight or sound in his yet weakened mental state may temporarily, if not permanently, prove injurious. Walking is preferable to carriage exercise, although the latter might be occasionally resorted to as the patient's mental state improves. From the first, all unnecessary restraint should be withdrawn. At the same time, great care should be exercised to keep the patient under constant espionage. He may yield suddenly, at a most unexpected moment, to a homicidal or suicidal impulse, and inflict injury upon others or himself.

Under certain conditions, restraint in some form is imperatively demanded. When this is the case, such a

[1] Dr. A. Luton, Prof. of the School of Medicine at Reims, has written a valuable monograph on the therapy of strychnine in alcoholism.

patient is best confined in a room of sufficient size to permit his walking about. It should be well heated in winter, and well ventilated at all times. There should not be any bedstead or other furniture or anything that the patient could hang himself to or injure himself with. We have such rooms in our asylum. These rooms are well-ventilated, and lighted by top-lights. The heating, lighting, and ventilation are all arranged with a view to the safety of the patient. The door is of extra strength, and has a small opening or window through which the patient can be constantly watched and food and drink passed. In such a room as this, the patient can have full liberty, and neither his suicidal nor homicidal tendencies can exert themselves. This method is far better, and not accompanied by those dangers to the patient, which not infrequently result from manual or mechanical restraint.

With the first returning glimpses of mental health, or as soon as it is safe to do so, the plan of regular exercise in the grounds of the asylum should be commenced, and systematically carried out. This has been already referred to. The patient should not see his friends until in full possession of his mental faculties, or, at least, sufficiently so as not to be injured by their visits too often; the tendency is to subject the yet hardly balanced mind to a trial it is not fitted for. Friends call, and stay too long; later on he may be visited by his legal adviser, or some business matters may be submitted to him. A period of exacerbation or excitement follows, and our patient, by an injudicious act, in twenty-four hours is back where he was weeks before, and probably permanently so.

A case of this kind occurred in my experience. The patient had suffered from the chronic form of alcoholic mania for some months, but after complete recovery and some weeks of convalescence, he was apparently restored to health, and was assigned to duty as an assistant

in the hospital department of our asylum. He was faithful and efficient. After being on duty a few weeks, he was allowed to assist in the case of a delirious patient. The effect was most disastrous—a relapse followed. For a year thereafter, he remained under my observation in the asylum, mentally unsound, and eventually was removed to an asylum for the insane. Do not make this mistake, and subject your patient too early to scenes of excitement. From what I have said, it is hardly necessary to add that a drinking bout, or even that which might in a healthy person be regarded as a moderate use of alcohol, will undoubtedly bring on a relapse.

But the duration of the treatment is of no less importance than the place and method of treatment. The time over which we should extend our treatment should not alone be until we have effected more or less complete mental restoration and the proportionate degree of physical health that necessarily must accompany it. But there should be a period of convalescence—a test or probationary period, so to speak. The patient should be under little, if any, restraint; nevertheless, proper espionage should be continued. By this time, medication will have been gradually withdrawn. The diet must be nourishing and generous; habits of regular out-door exercise insisted upon. Mental occupation, as well as amusement, must occupy some portion of the daily routine of life. He must have all reasonable liberty and the companionship of proper persons.

The mental condition of our patient is not what it was; it is now such that he can appreciate and be both influenced and elevated by moral and intellectual surroundings. By degrees, he is thus prepared to be reinstated in society. To plunge such a person into the vortex of commercial or social life would be to cause a relapse. The retirement to the quietude of a rural life for a few

months after the patient has left the care of his physician will do much to strengthen the mental and physical condition as yet unfitted for active duty.

The duration of the period of treatment, if we include the time of convalescence, would vary from six months to one year, but there can be no fixed limits, each case must determine that for itself; too much importance cannot be given to the period of convalescence or probationary period.

But we should neglect a very important part of the after-treatment of these cases, if we did not speak of the future occupation of our patient; change of business may be actually necessary, from sedentary in-door life to out-door life. The employment should be congenial to and suited to the capabilities of our patient. Want of occupation, where the patient is capable of being employed, would have an injurious effect.

When repeated relapses occur in spite of the most judicious treatment, then such a patient must be committed to the Inebriate Asylum and remain there indefinitely, or he will most assuredly become permanently insane.

From the consideration of the various phases of insanity to which inebriety may give rise or with which it may be connected we cannot but come to the conclusion that the average inebriate, if not all inebriates, are on the line which divides sanity from insanity. Some have not yet crossed the line, a certain proportion have crossed and recrossed this line, oscillating between periods of sanity and insanity, while not a few have passed over on the side of insanity and permanently so.

When we further consider the intimate relation that exists between inebriety and insanity, how in family histories we see inebriety in one member, insanity in another, and the tendency of the former to lapse into the latter as already stated, we must regard the inebriate, whether

periodical or habitual, as one whose mind, to say the least, is unbalanced, as a person who is on the verge of one of the many phases of insanity with which alcoholism may be associated. If this is the case, and we do not think regarding the inebriate in this light we are acting contrary to sound judgment, certainly not if we are guided by prudential motives, what practical deduction may we derive from such a view? We find the inebriate defective in will-power, his reason and judgment to a greater or less degree suspended, certainly while under the influence of his potations and for some time thereafter. His motives, if he can be said to have any motives, originated by a brain whose cerebration is defective, and the moral faculties, uninfluenced by proper intellection, either annulled or greatly impaired. We ask what position should such a person hold either in society or in business relations?

The question also naturally arises if the mental condition of the inebriate is more or less defective. How can we hold him responsible for his acts? He will lie, he will steal, he will commit forgery, there is no crime in the criminal calendar that he may not sooner or later commit. Shall we associate him with his act in a punitive relation? But if we assert a prior condition of mental deterioration, how can we hold him responsible for the deed?

It seems to me that the responsibility cannot rest on the inebriate, but upon the unfortunate customs of society and insufficient application of legal measures that permit him to be at large.

We believe, however, that better days are in store for the inebriate. The period of the policeman's club and ten dollars or ten days is rapidly giving way to a more enlightened sentiment, and society will not suffer the inebriate to injure himself or transgress its own code of law

and morals repeatedly as it has in the past, but place him under prompt and humane care, and if possible recover him from his diseased condition.

Much misery and expense will be avoided if the correct theory concerning the true status of the inebriate is accepted, and the proper stand-points from which he should be viewed we have endeavored to set forth in this paper.

REPORT ON THE RECENT APPEARANCES OBSERVED POST MORTEM IN A CASE OF DELIRIUM GRAVE.

BY

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MARY RYAN (case book No. 275) was admitted to this hospital, June 28th, 1883. Her brother, Patrick McD., visited her soon after, and from him was obtained all that is known of her previous history.

The patient, æt. 22, was a happy, innocent girl, living on her father's farm, near Dublin, when, in January, 1882, she was married, and left with her husband for New York; thence they came to Chicago, where her husband deserted her on the streets, leaving her with only three dollars, *enceinte*, and without a friend in the city. In April, 1883, Patrick, who was in St. Louis, received a letter from his sister stating the circumstance, and that she was quite destitute, begging for help. He immediately wrote to her, inclosing money. As he obtained no answer to several letters written to her, he came to Chicago to find her in jail, insane, just before her admission here. She had given birth to a girl-baby at the county hospital, seven weeks before. The distress of the brother was very great, and, as bearing upon the possible heredity predisposition, it is worth mentioning that he did not appear to me to be capable of enduring a great amount of suffering without risk of mental unhinging. He was a laborer, mannerly and quiet, evidently well brought up and disposed.

The patient raved incessantly. Her attention could be

attracted for an instant only. She recognized her brother, but the next moment lost all interest in him. Her restlessness was so extreme as to necessitate restraint to prevent her harming herself. She articulated sentences intelligibly enough, but incoherently. There appeared to be no particular thread to her utterances any more than in terminal dementia. Insomnia was so profound that, if she slept at all while here, the attendants remained unaware of it. Dr. J. C. Spray, the medical superintendent, was unremitting in his efforts to quiet and sustain her, but the usual sedatives had no effect whatever, and her condition grew rapidly worse, she developing the ordinary signs of acute delirium. Milk was fed to her freely, stimulation continuously tried, but without avail. July 9th, she was too exhausted to leave her bed, and, twelve hours before death, there was marked collapse. July 13th, while administering diluted brandy to her, she suddenly expired.

Twelve hours after death, I made a post-mortem examination of the contents of the head, and I may be pardoned for digressing enough to say that, could some of those who derive all their knowledge of asylum management from novel-reading and the sensational trash published in newspapers, for political purposes, have seen with what womanly tenderness the attendants had arrayed the corpse, the vulgar notion that asylum officials and employés are less tender-hearted than the rest of the world might have been foregone. Hypostatic congestion of the entire body was marked. Somewhat large pigmented macules, apparently simple ephelides, on hands and arms, not observable elsewhere. No pemphigus bullæ, such as Jessen (in *Allg. Zeitschrift für Psychiatrie*, 1880) considers a somewhat constant accompaniment, and which Spitzka ("Insanity," p. 250) noted as absent in two out of five cases in his experience. Vessels of conjunctivæ absolutely empty. Veins of dura congested. Pacchionian bodies

adhered to skull, which, when lifted, tore through these bodies into the superior longitudinal sinus, from which the blackened blood escaped and coagulated quickly. There was a strong adhesion of membranes and cortex to calvarium in left orbito-frontal region, of the size of a dime. The entire length of the dura over superior longitudinal sinus was deeply stained, a rusty color, an inch wide. General basilar and temporal adhesions of dura to skull, but no other brain adhesion than the one mentioned. Beneath the dura, covering every inch of the brain, to the depth of one-twentieth of an inch or more, was a heavy white exudate imparting a pearly lustre which almost obscured the fissures in which it lay especially deep. The upper part of the brain and its meninges were greatly congested, the larger vessels standing out like whip-cords, but the hyperæmia at the base of the brain was excessive. No departure from the normal observable in the disposition of the convolutions, but the entire organ was puffy, œdematous, and yielding; the disintegrative processes were so advanced as to require much effort to preserve the tissues for future microscopic examination, which will be made by Dr. E. C. Spitzka, Dr. H. D. Schmidt (pathologist of Charity Hospital, New Orleans), and myself, and will be reported in articles to be published hereafter, as this journal goes to press too early for their completion.

The consultation which Dr. Spray, Dr. Thuemmler (the assistant-physician), and the writer held over the progress and autopsy in this case resulted in justification of the treatment adopted and in the firm belief that the poor woman was doomed before reaching the asylum; tremendous doses of hypnotics would have been required to produce any effect, and it is questionable whether their exhibition would have been justifiable. Certainly, the bromides would have but added to the trouble; ergot and chloral had no more effect than were they not given at all;

stimulation was indicated with nourishment to overcome the exhaustion, as it progressed; but all will admit that stimulation exerted no beneficial influence over the hyperæmia, except in a possible *vis-a-tergo* anti-congestive way, or diffusant. It would seem that, whatever was done, cause and effect would travel in such a vicious circle that her speedy death was inevitable.

I am convinced that, had her malady been even faintly recognized at the outset, before the extensive vaso-motor changes had supervened, and her mental perturbation been quieted at a very early stage of her insanity, by hypnotics, which would at that time have availed, she *might have* bridged over the period of fright and grief with a sound mind. As to whether the mania began with the puerperal state or before I was unable to learn.

ON THE BRAIN OF A CAT LACKING THE CALLOSUM—PRELIMINARY NOTICE.[1]

BY

BURT G. WILDER, M.D.,

Professor of Physiology, Comparative Anatomy, and Zoology in Cornell University.

INTRODUCTION.—There have been described several (about thirteen) cases of the absence or deficiency of the human callosum, but I have heard of no other instance among the placental mammalia.[2] As an apparently unique specimen liable to loss or injury, I am desirous that it should be examined by neurological experts before making the dissection needed to expose its entire structure.[3]

HISTORY.—In April, 1879, while following my directions for the study of the cat's brain, a student in the anatomical laboratory of Cornell University (Mr. F. H. Chittenden), had killed a nearly grown male white and maltese cat; had removed the brain, hardened it in alcohol, hemisected it, and removed the pia together with, unfortunately, the plexus, etc., attached thereto. As not infrequently happens with the first brain prepared, the hypophysis and parts of the olfactory lobes were left in the skull. Failing to find the callosum where it was indicated in the direc-

[1] Read before the American Neurological Association, June 22d, 1883.

[2] The callosum is wanting in reptiles and birds, and absent or rudimentary in the implacental mammals (ornithorhynchus, echidna, opossum, kangaroo, etc.).

[3] There were shown at the meeting so much of the right half of the brain as is represented in Fig. 2, together with photographs (by Professor S H. Gage) of the mesal aspect of the entire right half, and of the transection shown in Fig. 4. The same preparations and photographs were exhibited at the meeting of the American Association for the Advancement of Science, at Saratoga, in August, 1879, but no account has been published beyond the brief mention in Wilder & Gage's Anatomical Technology, p.474.

FIG. 1.—Normal cat's brain; mesal aspect of left half; × 3.

tions, Mr. Chittenden showed the brain to Professor S. H. Gage, who promptly called my attention to the peculiarity. By exchange the brain became the property of the university (Museum numbers 381, 382).

Nothing is known of the ancestry, habits, or mental or physical powers of the cat; it had been taken at random from among the dozen or more cats at that time awaiting dissection, and although it had probably been an inmate of the "cat house" for several days, it had not attracted the notice of the student in charge by any peculiarity of behavior.

PREPARATION.—For comparison with the normal brain the left hemisphere has been transected at several points. From the right half, the metencephalon and epencephalon ("medulla" and cerebellum) have been removed; the remainder of the right half has had cut from its mesal side two successive slices, ranging in thickness from one to three mm. at different points. These sections were re-attached to the rest when the preparation was exhibited to the Association, and the lines of division do not show in the drawing. By pressure in a somewhat too narrow vial the right hemisphere has been slightly flattened at the dorsimesal margin, and the chiasma is crowded against the base; these changes appear in the photograph, and to some extent in the figures.

GENERAL DESCRIPTION.—Unfortunately, neither the cat nor the fresh brain was weighed. The animal was estimated to be about three-fourths grown, and its weight was probably not far from 2,500 grams. The entire hardened brain now weighs 15 grams. A normal cat's brain weighed 26 grams when fresh, and 16 after alcoholic hardening, making a loss of .615, or about .6; assuming a corresponding loss in this case, its original weight may have been 24.3 grams. By reference to the Tables on pages 237, 238 of my paper on "Cerebral Variation in Domestic

Dogs, etc." (Proceedings American Association Adv. Science, 1873), it will be seen that the average weight of six adult cat brains was 27 grams. This cat was certainly not full grown, and some allowance should be made for the olfactory lobes and the hypophysis, so that there is no reason for supposing it to have been unusually light.

The greatest length of the hemispheres is 33 mm. Of four normal brains, ages unknown, the respective lengths are 33, 35, 36, 37. The cerebral fissures present no unusual features, excepting such as are directly related to the callosum. Properly speaking, the F. *callosalis* does not exist at all. The dorsal ends of the F. *postradicalis* and F. *præradicalis* pursue a dorso-caudal direction instead of running almost directly dorsad to meet at the genu of the callosum. The dorsal end of the F. *hypocampæ* (hippocampal or dentate fissure) is not deflected, as would be the case were the splenium present.

In normal brains the superficial divisions of the cerebellum at the meson number thirty to thirty-six, according to the method of enumeration; in this brain, according to the same method, there are between twenty-five and thirty. The forms and proportions of the other parts of the brain are not noticeably peculiar, excepting the two of the commissures, to be presently described.

THE COMMISSURES.—No exact measurements or comparisons have been made of the postcommissura[1] or the Commissura habenarum. The following table shows that the præcommissura and medicommissura are both absolutely and relatively larger than in a normal brain:

[1] Most of the unfamiliar terms used in this paper will readily explain themselves to those who are conversant with encephalic anatomy and nomenclature, since the names are written in full upon the figures. For full definitions and synonyms, see Wilder and Gage's Anatomical Technology, pp. 472–491; and my papers, A Partial Revision of Anatomical Nomenclature; Science, ii., Nos. 38, 39: and The Brain of the Cat; Proceedings of the American Philosophical Society, xix., 524–562.

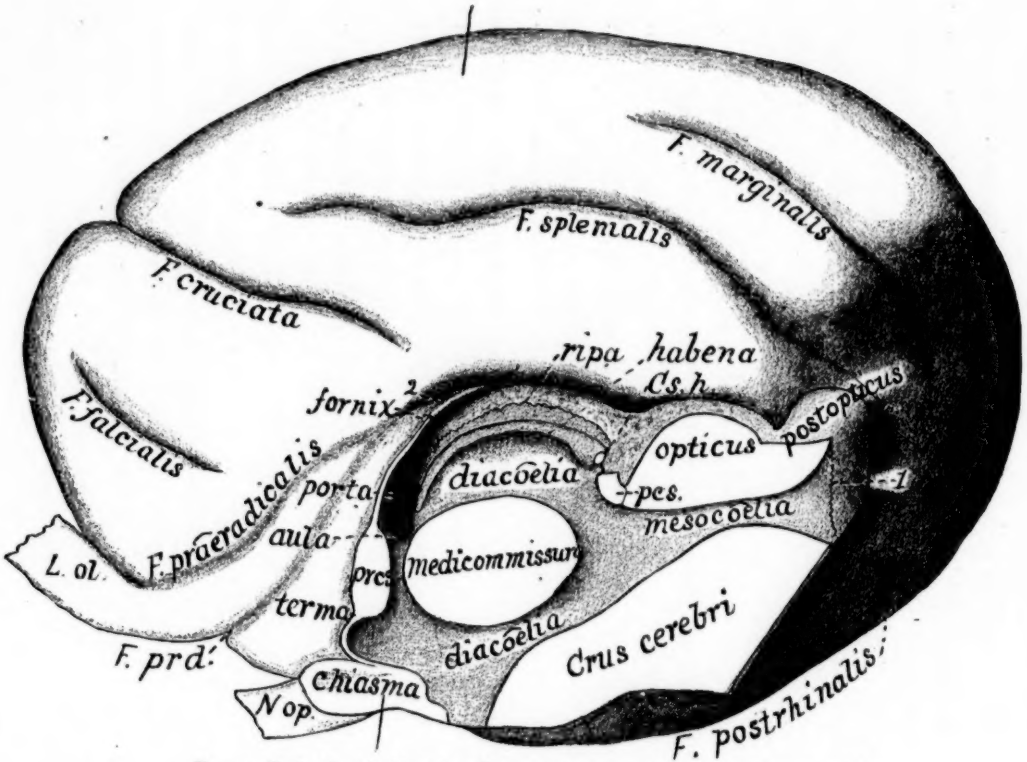

FIG. 2.—Brain of cat lacking the callosum; mesal aspect of right hemisphere, etc.; ×4.

	NORMAL BRAIN (NO. 342).	BRAIN LACKING CALLOSUM (NO. 382).
Greatest length of hemisphere	35 mm.	33 mm.
Præcommissura, dorso-ventral diameter.....	1 8 "	2.2 "
Medicommissura, " "	3.8 "	4.2 "
" cephalo-caudal "	4.2 "	5.2 "

The above figures suggest the idea that the functions of the callosum may have been performed by these two commissures, at least to the extent of preventing the exhibition of any marked mental or physical deficiency.

THE FORNIX.—I have used this word as referring to a single mesal organ composed of two halves belonging one to either hemisphere, in accordance with general custom, and also because I am not quite assured of the correctness of the view expressed editorially in this JOURNAL (I., 402), that there are two lateral parts, either of which may be properly called a fornix. In this brain, aside from the portion at and just laterad of the meson, all that would commonly be called fornix seems to answer to the fimbriæ on the two sides. The horizontal lamina, known as the lyra, seems to me to appertain to the callosum rather than to the fornix, and to be wanting in this brain.

As already stated, the dorsal margin of the fornix is rounded, natural and free, like the margin of the fimbria on either side with which it is continuous. But in the fresh brain, before the removal of the membranes and plexuses, as it must be presumed that the endyma was attached along the border of the fimbria and was reflected over the propiexus or its vessels, so in the fresh brain the endyma undoubtedly continued caudad from the free border of the fornix over the diacœlia, forming, with the superposed pia, the *diatela*, or proper roof of the "third ventricle."

THE CRISTA.—In Wilder and Gage's "Anatomical Technology," p. 476, it is suggested that this little body may perhaps mark the dorsal limit of the primitive terma

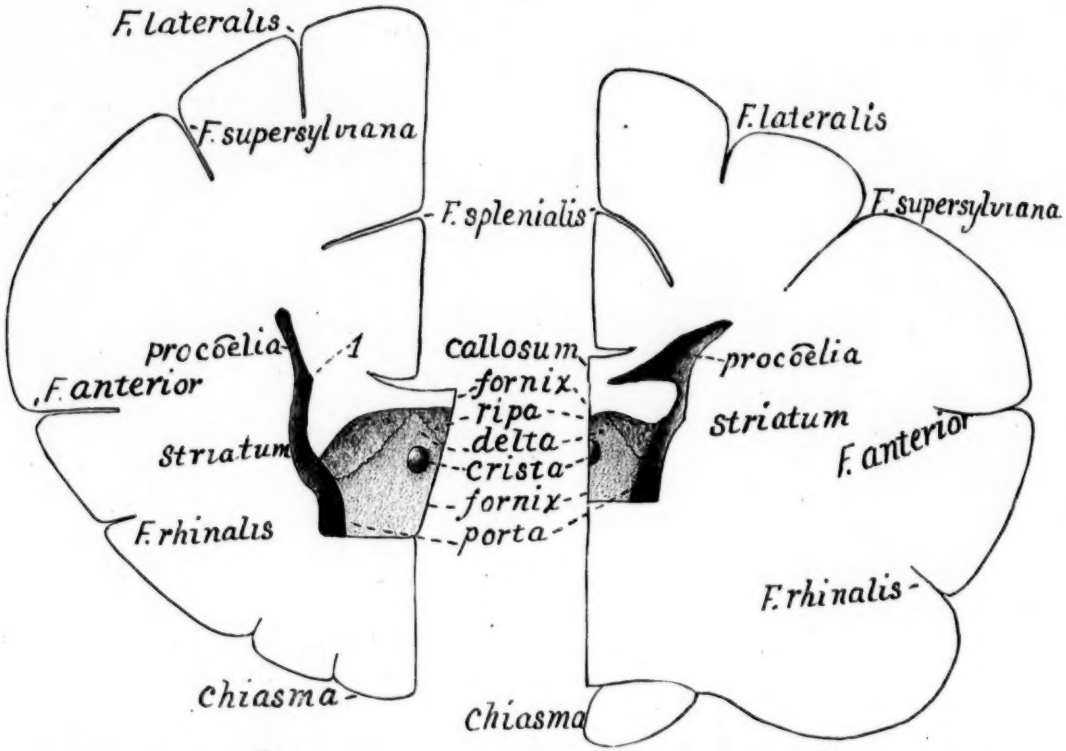

FIG. 3. FIG. 4.

Transections of hemispheres of cats; Fig. 3, left hemisphere of normal brain; Fig. 4, right hemisphere of brain lacking the callosum; ×4.

or lamina terminalis. Since it is here placed about midway of the length of the mesal part of the fornix, the above idea would seem to be incorrect, unless it be supposed that the fornix has developed farther dorsad than the primitive terma.

In this brain without the callosum from a placental mammal, we have, as an anomaly, a condition of things more or less nearly approximating the normal arrangement in the reptiles and birds, and in the monotremes and marsupials. In the course of a fuller examination of this brain, I hope to throw some light upon the question, which seems to me not yet quite satisfactorily settled, as to whether the callosum really exists at all in the implacental mammalia.

DESCRIPTION OF THE FIGURES.

FIG. 1.—The mesal aspect of the left half of a normal cat's brain; × 3. This figure is somewhat modified from Fig. 117 of Wilder and Gage's Anatomical Technology. It is to be regretted that it does not represent the right half, so as to be more readily comparable with Fig. 2.

Four different surfaces are shown :—

1. *Pial.*—Dorsad of the callosum, cephalad of the callosum, and ventrad of the caudal part of the callosum the exposed surface of the hemisphere is covered by *pia*. The last-named portion is shaded with lines to indicate that it retreats; it embraces parts of the fasciola and lyra. Of the visible fissures, the callosal, cruciate, and splenial are deep and distinct, while the others are shallow furrows.

2. *Connective.*—The sub-triangular area between the cephalic portion of the callosum and the fornix is in contact with its platetrope (lateral homologue) or separated therefrom by a thin layer of connective tissue. In man and, perhaps, some other mammals, the two surfaces are separated by a slight interval constituting a *pseudocœlia* (fifth ventricle).

3. *Endymal.*—The cœliæ (ventriculi) are lined by endyma. The cœlian boundaries are readily recognized, excepting the dorsal limits of the diacœlia. Just dorsad of the habena is an irregular line, the *ripa*, indicating the line of rupture of the diatela or roof of the diacœlia.

4. *Cut.*—The remaining exposed surfaces are formed by the hemisection (mesal section) of parts which cross the meson. The parts so divided are the cerebellum, myelon, "medulla" (the ventral portions of the metencephalon and epencephalon), valvula, crus cerebri, optici, postoptici, conarium, albicantia, hypophysis, tuber cinereum, terma, and crista. The following are more or less decidedly commissural in their nature: Chiasma, fornix, lyra, Commissura habenarum, postcommissura, medicommissura, præcommissura, and callosum. The place of junction of the fornix proper with the lyra, which probably appertains to the callosum, is indicated by a short transverse line.

FIG. 2.—The mesal aspect of the right hemisphere, diencephalon and mesencephalon of a cat's brain lacking the callosum; ×4. Drawn by Prof. E. C. Cleaves from the specimen, from an outline drawing by the writer and from a photograph by Prof. S. H. Gage.

The pial surfaces are shaded either completely or along their borders. The endymal surfaces are also shaded, but more smoothly, and for the most part less deeply than the pial. The irregular line marked *I* indicates the line of separation of the almost membranous valvula from the postopticus. So much of the shaded surface as lies to the right of the line is pial or ectocœlian, while that to the left is endymal or entocœlian. The longer irregular line marked *ripa* also separates the ectocœlian dorsal surface of the thalamus from its endocœlian mesal surface, of which the habena is an undulation. The hypophysis and conarium have been detached; the lateral attachment of the latter is indicated by the short black line between the postcommissura and the Commissura habenarum, which also demarcates the ectocœlian and entocœlian surfaces. The porta (Foramen Monroi) appears as an oval dark spot.

The cut surfaces, so far as shown, are as in Fig. 1. The præcommissura, postcommissura and Commissura habenarum are indicated by the abbreviations *prcs.*, *pcs.*, and *Cs. h.* The fornix was divided just dextrad of the meson, so that the mesal crista does not appear in this figure. As stated under Fig. 1, the dorsal limit of the cut surface of the fornix is indicated by a short line nearly opposite the dotted line from the word *fornix*. The less clearly defined light line curving dorso-caudad from this point represent the natural free dorsal margin of the fornix, which is continued laterad into the fimbria.

FIG. 3.—Caudal aspect of a transection of a normal right hemisphere; ×4. Drawn like Fig. 2.

The plane of section passed just caudad of the crista through the aula and portæ. The cut surfaces are unshaded. The shaded convex surface forming the lateral wall of the procœlia is the entocœlian surface of the striatum, but no effort has been made to define its parts or lateral limits. Half of the divided crista appears at the meson. The irregular line, *ripa*, indicates the line of detachment of the endyma when the plexus upon which it was reflected was torn out. So much of the fornical surface as lies laterad of it is ectocœlian, while the mesal portion is part of entocœlian *delta*, forming the dorsal wall of the aula and porta. The dotted line from the word *porta* stops on that part of the delta, near the lateral border of the fornix, which forms the cephalic boundary of that orifice; its caudal boundary is the thalamus, here not shown; its ventral limit is the junction of thalamus and fornix, while its dorsal limit is indicated by the lateral part of the ripa, whence the endyma was reflected upon the portiplexus to a corresponding point upon the thalamus. The darkly shaded space laterad of the fornix is not the porta, but the procœlia (ventriculus lateralis).

FIG. 4.—Caudal aspect of a transection of the left hemisphere of the brain lacking the callosum; × 4. Drawn like Fig. 2.

The plane of section is indicated by the vertical lines at the dorsal and ventral margins of Fig. 2. Since, as stated under Fig. 2, the plane of hemisection passed dextrad of the meson, this transection includes the entire crista and more than half of the delta. The callosum is seen to be totally absent, and the procœlia does not approach the meson so nearly as in the normal brain. At first sight, the depression just dorsad of the fornix might be homologized with the depression dorsad of the callosum in Fig. 3, but the latter is a true callosal fissure, which, as may be seen from Fig. 2, does not exist in the abnormal brain.

PROVISIONAL COMMUNICATION REGARDING A CASE OF PONS HEMORRHAGE, WITH DESCENDING DEGENERATION OF THE STRATUM INTERMEDIUM.[1]

BY

E. C. SPITZKA, M.D.

THE case forming the subject of the present communication offers so many points of interest, and one of them of so suggestive a character that I may be pardoned for presenting these few remarks, anticipating the complete examination of the specimens.

In brief, the history is that of a German trussmaker who, six years before his death, while straining at stool, suddenly felt a sense of giving-way and faintness, from which he recovered to find himself numb and somewhat helpless on the right side, this helplessness and numbness involving the upper and lower extremity, as well as the side of the face, in diminishing intensity, in the order given, according to his account. He recovered from the motor disturbance entirely, and at the date of my examination his right arm was, if anything, more powerful than his left, the muscular power being about twice in excess of what the dynamometers in use are capable of indicating.

His speech was very thick and indistinct for a few weeks after the occurrence. About two years afterwards —a year before coming under my charge—he had a seizure repeating the character of the last in every particular, but of lesser intensity.

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[1] Read by title at the last session of the American Neurological Association.

At the time of my first examination, I found a slight degree of tongue disturbance, not amounting to more than a thickness of speech, which increased on prolonged speaking; a feeble innervation of the facials, particularly of the buccinators; but what the patient complained of was this: *that, from the time of the first attack, without any variation whatever, he had not been able to wield the instruments of his trade, as far as the right hand was concerned.* He was in the habit of saying: "*So ein Kerl wie ich, der Bäume mit diesem Arm ausreissen könnte, und einen Ochsen niederschlagen, aber keine Nadel führen kann.*"

On examination with the æsthesiometer, it was found that, excepting the tips of his fingers, the distances at which the points of the instrument could be distinguished apart were the same on both sides; the sensibility of the cheek and lips was slightly impaired. At the tips of the fingers, the distances did not sink much below the minimum physiological limits, but were about one-quarter less than on the opposite side. The trouble was one of inco-ordination so great that I could not account for it by the slight degree of anæsthesia present. He could guide his movements well enough by the aid of vision, but those *quasi* automatic movements—I mean automatic in a person of his occupation—on which he depended as a workman it was impossible to perform. There was a loss of accommodation of the muscles, as to direction in space and intensity, which could, to a certain extent, be neutralized by the aid of vision.

Another constant and invariable symptom was a lack of security, associated with what the patient called a "*dummes Gefühl,*" pervading his right side.

The diagnosis of a focal pons lesion, probably hemorrhagic, had been made by the writer, and so reported to the patient and relatives, as well as to several colleagues.

Not to make unnecessary repetitions, as a complete

history and post-mortem report will be published when the histological study of the case is completed, let me say that, without any variation in the last three symptoms related, the patient died from the effect of other cerebral complications, in the way of thrombotic softening, whose symptoms were clear and easily differentiated from those which had constituted the permanent back-ground.

On the autopsy, held in presence and with the aid of Drs. N. E. Brill and F. A. McGuire, a cyst was found in the pons, measuring, in its greatest (transverse) diameter, about one-third of an inch, and a little over half as much in its shortest (vertical) diameter. It was irregular in shape, and extended a considerable distance from before backwards. It was situated to the *left* of the raphe adjoining it, and involved almost the entire area, if not the entire area, of the *left stratum intermedium*. There were other evidences of chronic disease of the cerebral vessels, softened patches, small hemorrhages in the thalamus and cortex, all of evidently recent date.

The most noteworthy feature was the existence of a secondary degeneration of the vertical fibre-bundles which lie dorsad of the pyramidal tract, between the olive and raphe, and which Flechsig terms "Olivenzwischenschicht" (inter-olivary layer), Meynert "innere Abtheilung des reticulären Feldes" (inner division of the reticular field), and which I regard as the continuation of the stratum intermedium (Bündel vom Fuss zur Haube of Henle). This degeneration was distinct in all the levels of the hypoglossal origin; it was absolute just dorsad of the pyramids, and, gradually diminishing, disappeared at the level of the olivary hilus.

The sclerosed tract has clearly lost in area, for the raphe deviates towards the left near it, and the pyramidal tract is less prominent on the left side, not owing to any intrinsic diminution, but owing to the shrinkage of its backing.

This case supplements, in a remarkable way, the one reported by Paul Meyer, in which a pons hemorrhage, occupying a point *just laterad* of the one occupied by the (hemorrhagic) cyst of my case, produced descending degeneration of those fibres which, for some distance, adjoin the stratum intermedium, namely, the lemniscus.

If the reader will glance at Meyer's figure in the thirteenth volume of the *Archiv für Psychiatrie*, let him imagine the area between the lesion and raphe, and a little ventrad which was healthy in his case, as the affected region in mine; and, *vice versa*, the diseased area in Meyer's case, as nearly unaffected in mine; and he can form an accurate conception of how neatly the two cases are complementary.

As far as I have been able to trace the degeneration through various levels in a series of sections made with my microtome, it occupies the following areas:

I. The cyst, while mainly to the left of the median line, extends about two millimetres to the left of the raphe, without, however, appearing to involve the stratum intermedium on that side.

II. In the upper part of the oblongata, just behind (caudad of) the pons, the degenerated area fills out the triangular space between olive, raphe and pyramid, and sends out a prolongation under (ventrad of) the olive, which extends to the latero-pyramidal edge.

III. In the middle of the olivary level, this area has nearly the same shape; it is, however, higher in the direction of the raphe fibres, more split up by fasciculi arcuatæ; these latter, which, intrinsicially normal (?), yet run a more undulating course than on the healthy side, owing to shrinkage of their matrix. The lateral detachment is less pronounced than in level II.

IV. In the lower olivary level, the degenerated area occupies the same area as in III., and the lateral spur is

still less distinct, though recognizable over the entire ventro-olivary area referred to in describing level II.

V. Below the olive and just above the true pyramidal decussation, the fibres of the decussation of the *stratum intermedium* (piniform or fircone decussation, decussation of the stratum intermedium, Spitzka; upper or sensory pyramidal decussation of Meynert) are intact, *as far as those crossing from the right to the left are concerned*, atrophic, and, to moderate magnifying powers, *absent as far as* those crossing *from the left to the right* are concerned.

VI. In the level of the pyramidal decussation, the column of Goll is less voluminous on the right side than on the left. This difference is due to the *atrophy of the nucleus of the column of Goll* on that side. No other anomaly is here found up to date.

The above demonstrates that, as maintained by the writer several years ago, there is a continuous nerve tract, decussating like the pyramidal decussation, connected with the posterior columns of the spinal cord through the intervention of the nuclei of the columns of Goll (and in lesser degree of those of Burdach), which crosses the median line above the pyramidal decussation, and above that is identical with the interolivary layer and stratum intermedium.

The interesting physiological questions suggested by this case will be discussed in the fuller report, to be published in the next number, and accompanied by illustrations.

THE CASE OF DIEDRICH MAHNKEN, THE INSANE MURDERER OF DIEDRICH STEFFENS.

BY

LANDON CARTER GRAY, M.D.

ON an evening of the spring of this year, the newspapers of the city of Brooklyn contained accounts of a startling act of crime. Diedrich Steffens, a young, inoffensive driver of a beer-wagon, had been suddenly approached by one Diedrich Mahnken, a grocer, grasped by the clothing over his chest, held firmly, and shot to instantaneous death by seven bullets from a seven-barrelled revolver. Jealousy was supposed to be the cause of the deed. As the eager ears and keen scent of the reporters could discover naught against Mahnken's wife, the murder was regarded as the more brutal, and, as a matter of course—for cheap wisdom is always popular—it was indignantly predicted that a defense of insanity would be adopted. Two days after, I examined the murderer, on behalf of Judge James Troy, his counsel. I did so in conjunction with Dr. Geo. H. Atkinson and Dr. J. C. Shaw. I quickly saw that there could be no question of the man's insanity. He had the insane manner—that peculiar air and address which is difficult to describe, and yet which any one accustomed to being with the insane can readily recognize. He was like one dazed. His mental faculties, although capable of much of the pseudo-logical reasoning that characterizes the monomaniac, had to be spurred up to effort by persistent interrogation. He was evidently

suffering from considerable physical exhaustion, which, due mainly, as the sequel will show, to many years of illness, had doubtless been greatly increased by the excitement consequent upon the murder. His pupils were dilated; his face was pale. There was some slight tremor of the tongue, of the facial muscles in talking, and of the hands when extended. There was no paralysis whatever. He stated that he had shot Steffens because Steffens had been intimate with his (Mahnken's) wife. Pressed for proof of this statement, he maintained that Steffens had been in the habit of frequently coming to the house; would come late at night, and make signals to Mrs. Mahnken; would come by day, stand on the opposite side of the street, make signals again to Mrs. Mahnken, and mock him (Mahnken); that during the progress of some repairs in his house, he had found a small hole which had been left in the wall for the clandestine entry of Steffens; that there hung in his wife's room two pictures of donkeys,[1] one representing a donkey placidly munching hay in comfortable quarters, the other depicting another donkey shut out in a driving storm, and that these were placed there by his wife and Steffens in mockery, the first alluding to Steffens, the second to him (Mahnken); that his wife had brought home a flower from the grave of Steffens' niece, and had carefully cherished it;[2] that Steffens had given Mrs. Mahnken a ring; that there had been a secret marriage between his wife and Steffens; and so on into many particulars, not only too numerous to mention, but so multiplied that each succeeding examiner and each succeeding examination brought new ones to the light. He had long had hallucinations of hearing,

[1] These were put in evidence at the trial, and proved to be two coarse, cheap lithographs, purchased some ten years before the murder.

[2] At the trial, this was produced, and it proved to be a candied flower, such as are put upon frosted cakes.

but he recognized their unreal basis. He would hear voices mocking him as he rode, both day and night, and he would hear them when lying in bed at night. I cannot feel certain as to whether or not he had illusions, although I deem it extremely probable that he had. I saw him again several times before the final disposal of his case, several months afterwards. At each of these interviews, his manner was much the same, although he was at times much more alert mentally than at others. As time went on, however, whether from the progress of his mental affection or from the confinement in the dark cells of the jail and the agitation natural to one in his condition, his symptoms increased, and he displayed more and more of his mental wreckage. A lunacy commission was appointed to determine his mental condition, and this consisted of Dr. J. G. Johnson, Adolph Simis, Esq., and myself.

Before this commission were brought numerous witnesses, medical and lay. By means of the latter, a history was obtained of the prisoner for some nine years previous to the shooting. It was thus made known to us that the prisoner's delusions were at first that his wife was robbing him, in conjunction with a young clerk in his service. He had shown symptoms of mental aberration for a year or two, when he began to drink, at times heavily. Subsesequently to this period, his delusion as to being robbed was changed into the one of marital infidelity. Dr. E. C. Spitzka, one of the medical witnesses, made, in this connection, the significant suggestion that this alteration in the nature of the delusion was due to the alcohol, to which it might be added that the same cause had probably produced the mental dulness which was unusual for a monomaniac. During these many years, a gradual change had been noted in the man's manner. He was excitable about trifles, quarrelsome with customers, care-

less about business details, concerning which he had formerly been precise and careful. One witness, who had no personal acquaintance with Mahnken before the shooting, testified that one day, when he was standing near the grocery store which Mahnken kept, the latter "glared" at him, and, walking slowly round and round him, "glared" at him again from head to foot. The witness was, not unnaturally, somewhat taken aback at this behavior, and spoke of it to his wife as singular, the more so as the man was a stranger. The attendants of the jail in which the prisoner had been confined for some three months before these sessions of the commission, had observed no material alteration in his behavior, nor had they seen any evidences of malingering; and I am accustomed to attaching considerable weight to the opinion of an experienced jail attendant of a large city jail, for he is necessarily brought in contact with many and varied forms of criminality, and generally becomes expert in the detection of shamming. The lay witnesses were, one and all, unequivocal in expressing their belief in Mahnken's insanity, nor was there less unanimity among the medical witnesses, who were Drs. Geo. H. Atkinson, A. W. Shepard, G. N. Ferris, J. C. Shaw, and, finally, Dr. E. C. Spitzka, who examined the prisoner on behalf of the brother of the victim. The irreproachable character of the wife was not questioned by any one.

The question of Mahnken's responsibility was not, however, as easily determined as that of his insanity. The New Code of the State of New York, amended in 1882, has this language:

"A person is not excused from criminal liability as an idiot, imbecile, lunatic or insane person, except upon proof that, at the time of committing the alleged criminal act, he was laboring under such a defect of reason as either

1. Not to know the nature and quality of the act he was doing; or

2. Not to know that the act was wrong."

Had the makers of this code had some practical knowledge of the insane, such as comes from a close-sighted observation of them that is free from metaphysical and theological prejudice, they would have seen that this language was in the highest degree ambiguous, because it does not give any clue as to how we are to determine whether or not the lunatic knows the nature and quality of the act, or that it is wrong. Are we, for example, to determine this fact by the utterances of the lunatic himself, or by the form of his insanity? Lawyers, judges, and juries will, of course, prefer the former criterion, for the very simple reason that they are not possessed of sufficient knowledge to make use of the latter. Indeed, the recent case of Guiteau has shown how strong is the prepossession in favor of this method of judging. We are expected to deal thus with a monomaniac. He may have a delusion, which is simply a fixed belief, a thousandfold more unalterable by facts and arguments than the most obstinate opinion in a sane man, influencing the thoughts and deeds of the individual a thousandfold more than the most obstinate sane belief. This delusion is, we will suppose, that he has been a spy upon a certain band of conspirators, has betrayed them, that he is being dogged by one of the band, who has sworn an oath to take his life. This delusion, let it be remembered, is the product of disease of the brain, the same in kind, though not in degree, as the fury of the raving maniac, the imbecility of the idiot, or the paralysis of the apoplectic. Laboring helplessly under this delusion, he meets some individual whom his delusion points out as the conspirator sworn to murder him. He shoots this individual, probably with great violence, which seems like brutality; for is he not struggling for life?

We question this monomaniac. Like all monomaniacs, he is logical, often seemingly so to an extraordinary degree. If asked if he knew what he was doing when he committed the murder, he will answer yes. Did he know it was murder? Yes. Did he know he would be punished for it? Yes. He will show that he knows perfectly that murder is punished by hanging or imprisonment. Then why did he commit the murder? Because his own life was in danger. Are we to hang this man? If so, then must we bastinado our raving maniacs and our imbeciles, and send to prison the apoplectic who falls unconscious in the street. Can the miserable bearer of such a delusion be said to know the nature and quality of the act he did when he committed the murder, or to know that it was wrong? There can be but one answer to this question. *We must admit the fact—of vast importance in legal medicine—that a person may be hopelessly insane, beyond the control of anything but his diseased brain, and yet verbally, as it were mechanically, seem to know the nature and quality of any insane act of his own doing, or that it was wrong. In other words, the form and degree of a person's insanity, as expressive of the extent to which his mind is impaired, must determine that person's capacity to judge between right and wrong, and not his mere verbal utterances.*

This was the view which I took of Mahnken's case, and in which my brother Commissioners concurred. The medical witnesses had all stated their belief that the prisoner was irresponsible. The Commission, therefore, found Diedrich Mahnken insane and irresponsible. He was sent to the Utica asylum shortly afterward, and there, as I am informed by the superintendent, his insane symptoms have markedly increased.

A CASE OF VERBAL BLINDNESS WITH RIGHT LATERAL HEMIANOPSIA.

BY

T. A. McBRIDE, M.D.

D. F., AGED fifty-nine, is a man of culture, and engaged in literary work. For the last five or six years has had attacks of pain in left side of head, with dizziness and partial blindness. At such times there was more or less mental confusion. September 24th awakened in the morning unable to express himself quickly in words, and when the morning paper was handed to him, he found himself unable to read. I was then sent for. His condition was as follows:

No facial paresis; no deviation of the tongue; dynamometer, R., 55, 53, 50; L., 45, 45, 47; no paresis of the lower extremities; patellar tendon reflex present on both sides, but not exaggerated. Pupils normal; superficial skin reflexes present, and the same on both sides of the body.

He understood perfectly every word which was addressed to him. He was able to name the articles in the room which he made daily use of, but was at loss for a few moments for the name when shown something which he seldom saw or rarely used. Has some difficulty in recalling proper names. Speaks clearly and articulates well when allowed to speak slowly, but when he attempts to speak fast, he stutters and repeats words. When he is given a newspaper or a book, and asked to read it, declares that he cannot. I asked him to write his name.

which he did, but said that he could not read it. I then requested him to write something for me. He wrote the following:

"I hadly know what to wright. The words dont sem sem dont sem just wright, and my words are very bad at at all." He was unable to read this after having written it. His spelling and repetition are seen in the words "wright" for write, and "wright," for right, "sem" for seem, etc. I then dictated to him: "We have been having very hot weather, and to-morrow we ought to have a storm." This he wrote fairly well. He could go through the letters of the alphabet without any mistake, and pronounce the letters distinctly. He could count up to one hundred rapidly, and without mistakes. Ophthalmoscopic examination revealed nothing abnormal.

On having the patient fix one eye upon a candle, and having his wife watch that no movement of the eyes occurred, I was able to ascertain that he had right lateral hemianopsia.

The pulse of the patient was of high tension; there was accentuation of the second sound of the heart and hypertrophy of the left ventricle. Urine, specific gravity 1015, and contains a trace of albumen.

October 1st. Patient much improved. Talks without difficulty; does not stutter or repeat words. Is at times at a loss for a word for a few moments. He reads now well—reads newspaper and written matter. He did not mention whether one was easier than the other. The right lateral hemianopsia is still present, and to the same extent. No mental confusion. He finds, however, that he can no longer add up figures when they are arranged horizontally—on the same line—and can only do this when they are arranged in a column. This is probably to be explained by absence of vision in the right field. Seldom gives subjective evidence of the presence of the

hemianopsia, although this is easily demonstrated the moment that the eyes are fixed.

The patient was under my immediate observation for two months, and was able to close up his business affairs himself, which I had advised him to do, and go to the country. Before leaving the city, he called on me, and I found his condition as stated in note of date of October 1st. Writing to me four months later, he states that he is about the same, the hemianopsia still remaining; that he could read fairly well, and also write. He died of an attack of cerebral hemorrhage about one year after the attack above described.

The interesting features in the above case are the presence of "word blindness" and right lateral hemianopsia, and the rapid disappearance of the "word blindness" in about one week, and the continuance of the hemianopsia.

Westphal, Charcot, and Hughlings Jackson have all called attention to the existence of right lateral hemianopsia with "word blindness." It is very likely, as Hughlings Jackson suggests, that hemianopsia is often overlooked in cases of aphasia, since hemianopsia, even when owing to central disease, does not prevent a patient from reading. This is shown in the above case. The "word blindness" entirely disappeared, and the hemianopsia remained, yet the patient was able to read about as well as ever. This case was observed in 1880, before, I believe, any cases of the occurrence of "word blindness" with hemianopsia had been reported, and the discovery of it was made while examining the movements of the eyes.

The lesion in this case was probably that of a hemorrhage in or about angular gyrus (Ferrier) or occipital convulutions (Munk) of the left hemisphere.

ON AN AUTHENTIC CASE OF DISAPPEARANCE OF THE TENDON REFLEX, WITHOUT ASCERTAINABLE PATHOLOGICAL BASIS.

BY

E. C. SPITZKA, M.D.

WHILE examining the patellar tendon reflex of a patient suffering from diphtheritic paraplegia, a physician, Dr.——, accompanying me said, "mine is just as bad," and showed me that indeed it was absent in him as well. This fact, in itself not surprising, inasmuch as the knee-jerk is known to be absent in a few persons who are not sufferers of a spinal disease, was supplemented by the surprising statement that the doctor had had this phenomenon, like other normal persons, in his youth, and had lost it between ten and seven years ago.

I made a further investigation of his case, and am indebted to him for the permission to publish these notes.

Dr.—— is thirty-two years old, married ten years, has a family of four healthy children, never had syphilis. Between his eighteenth and twenty-second year, he was a heavy drinker, that is, he drank heavily in spells, not constantly, but he had decided symptoms of alcoholism, and, as he expresses it, had attacks which were not far removed in character from *delirium tremens*. These manifested themselves in terrors, dreadful anticipations of death, and such like, accompanied by a slight tremor, general pallor, and followed by profuse sweats. With this, he had peculiar sensations of "going down" in his stomach and ever after

noted that no medication relieved him, unless accompanied by antidyspeptic measures. He abandoned drinking and is now a prosperous and busy practitioner, who gives neither mental nor physical indications of alcoholism, and who retains no relics of his dissipations, unless it be a slight grade of hepatic torpor.

The doctor always had a peculiar gait, which may be best described by the German term "*wippend*"; he is very stiff in the knees and straight in his back when walking, and consequently starts from side to side. Something of this is noticeable in all his male children, and it does not exceed in any way the degree of an idiosyncrasy of gait, if I may so call it.

The pupils are perfectly normal, reacting very readily to light, accommodation, and convergence; his eye-sight is unusually good for a member of the medical profession; vision emmetropic.

Since his "alcoholic period," his lower extremities are a little weaker, and he believes that it is in consequence of this that he is more cautious in walking in the dark. On ordering him to close his eyes, it is found that he can not only stand without swaying, but walk and change in direction, and endure other tests of co-ordination as well as other persons. There is no anæsthesia nor bladder trouble.

The sexual power is, considering all the attendant circumstances, moderately fair. First coïtus at sixteen; has never been able to repeat the performance within a night if anything, the power has slightly increased since the alcoholic habit was corrected. He never took bromides, chloral, or other narcotics to excess.

The knee-jerk is absolutely absent on the right side, and imperceptible on the left, though the doctor feels a thrill here, which is lacking on the right side when the patellar tendon is struck. The hamstring reflex is fairly present on the right and absent on the left side. The doctor recol-

lects that the testing of both reflexes was a common sport among the school-boys, and that it was very frequently elicited in his case, he not differing from others in that respect, having a full excursive jerk. He was also in the habit, long before and during the time he studied medicine, and before the medical importance of the phenomenon was dreamed of, of striking his tendon when idle, or when riding in the car, etc., and recollects having it present up to his seventeenth year; he can distinctly trace its present state back seven years. It consequently disappeared between his eighteenth and twenty-fifth year. He has asked himself the question whether the frequent abuse of the phenomenon may not have had something to do with its disappearance. At no time has the discovery of its absence, in connection with its diagnostic bearing, given him any uneasiness, though he was during his alcoholic and student periods very hypochondriacal. Occasional *cramps* of the gastrocnemius on the left side have been noticed, and sometimes, on proceeding to put his feet in slippers when these are on the floor, his feet start back suddenly, as if pricked by a pin.

I am aware that Möbius has made observations tending to demonstrate the disappearance of the knee-phenomenon in old persons; but I believe this is the first case in which its disappearance has been determined within the life-time of one and the same individual, without an adequate pathological basis, such as spinal disease or syphilis.

SOCIETY PROCEEDINGS.

TRANSACTIONS OF THE SOCIETY OF MEDICAL JURISPRUDENCE AND STATE MEDICINE.

Fifth Regular Meeting, May 10th, 1883.

The fifth regular meeting of this Society was held at the Academy of Medicine on Thursday evening, May 10th, 1883. In the absence of the President and Vice-President, Dr. C. S. Wood was, by motion, invited to preside. The minutes of the last regular meeting of the Society were then read, whereupon a motion was made by Mr. Avery, and seconded, that those remarks contained in the minutes, made by Mr. Eller concerning the indirect resignation of Dr. Finnell, be erased. The motion was carried after some discussion. It was also moved, seconded, and carried that the words "there seemed to be some difference among the Trustees as to the place of meeting" be expunged. There being no other changes, the minutes were ordered approved as read. The minutes of the special meeting of April 20th were then read, and also ordered approved, there bring no corrections or objections. The Trustees, through their President, then gave their report. They announced that the next meeting of their body would be held on the first Thursday in June, at the residence of Dr. E. C. Spitzka, 137 E. 50th street, at 8 P.M. They also announced that the next paper for the June meeting would be given by Dr. Spitzka on "Spinal Injuries as a Basis for Litigation."

They recommended that "the Society instruct the Corresponding Secretary to notify all existing Medico-legal Societies of the foundation and existence of this Society, and to send to them copies of its By-laws, and to invite correspondence with them." At this stage of the reading it was moved, seconded, and carried that this recommendation be approved by the Society.

The Trustees recommended for honorary membership, Dr. T.

Gallard, Paris, France, and Dr. von Krafft-Ebing, of Graz, Austria, and a vote for these gentlemen was ordered for the next meeting. The reader reported as recommended by the Trustees for election, Drs. M. D. Field, 31 W. 42d st., and R. L. Miranda, 54 W. 37th st. A ballot was then held for these gentlemen and resulted in their unanimous election, seventeen votes being cast, all in their favor.

At this stage the chair was resigned to the Vice-President, Dr. J. S. Wight, who had arrived meanwhile. The report of the Trustees was then, by motion, accepted.

The Secretary then read some communications which he had received from some of the newly elected honorary members. A motion was made and seconded that the communications be received and incorporated in the minutes. Amended to be filed by the Corresponding Secretary. The amendment was carried.

The paper of the evening was then read by Mr. Chas. H. Kitchell on "Prison Sanitation." Before proceeding with the reading of his paper, Mr. Kitchell said: It is with much reluctance that I appear before you this evening, not from want of interest in the subject, nor because I do not deem it of importance to the State, and worthy of your most serious attention, but for the reason that I have not had the time to prepare a paper such as the importance of the subject requires, and the high character of this Society demands. It was not until Saturday last, upon my return to the city after an absence of some weeks, that I learned that the meeting was for the 10th, I having it fixed in my mind for the 20th. I am not in the habit of making excuses, but as an apology to you and in justice to myself, I make this explanation, that I may claim the charity of your criticism, for I feel that no man has a right to inflict upon so earnest, intelligent, and learned a body of gentlemen, who have honored him with an invitation to read a paper before them, any of the crudities of his thought, but only after the most careful and thorough preparation, and I hope that I may be permitted, if this paper is to form a part of the printed proceedings of this body, to recast the same into more fitting form.

PRISON SANITATION.

BY

CHAS. W. KITCHELL,

Of the New York Bar.

THE reformation of our prison systems (if systems they can be called) is a subject that has occupied my attention

for a number of years, and each year the conviction grows stronger, that it is a question of very grave importance to the State, and one that, for the protection of Society, must be more thoroughly considered, and wisely treated, than it has hitherto been.

In the old world, where populations are so dense, the many evils growing out of the former systems of treating convicts frightened the state, until it was compelled, for its own safety, to take action, for it found to its sorrow that, with all its power, it could not crush the criminal into obedience to its laws, but that from year to year the tide of crime increased and poured into the quivering bosom of the state through thousands of avenues a flood of corruption and crime that made it shrink back, trembling—affrighted—aghast.

In this country, until within comparatively a few years, the subject has received but little attention, either from individuals or legislatures; and we are to-day almost a century behind other civilized nations in the treatment of our criminal classes; and this neglect is working out to-day in almost every State the same sad results that it did in the older countries. It is true that some modifications have been made in our laws and practice, but for the most part the spirit of the middle ages moves and controls in them, and the student of penology ever finds that the law in its slow and cautious policy lags far behind the progress of true knowledge. We have, for the most part, treated the whole question in a "laissez faire" kind of a way, underrating its magnitude and importance; but the time has come, and people begin to realize, that this policy is as cruel to the criminal as it is dangerous to the state; that the question must be solved. It is not simply a question of humanity, but of public safety. It is not simply a question as to the two hundred thousand criminals that to-night, as I speak to you, crowd the pris-

ons and jails of the country, but the larger number, their associates outside of prison walls, who are gradually led into a criminal life. It is not simply a question as to the hardened criminal, for whom but little hope of reclamation exists, but of the sixteen per cent of lads under sixteen years of age, and the sixty-seven per cent under twenty-five years of age, who, for the first time, have been convicted, and by the unwise (I might almost say, criminal) mismanagement of our prisons and jails are cast forth upon society from within prison walls with all their criminal instincts intensified, to pollute and corrupt society; it is not only the thousands of young girls and women that find their way within our prisons, but the thousands, both men and women, that are corrupted by them on their release, and who carry into thousands of happy homes disease which generations cannot eradicate.

I need not tell you, who are physicians, how serious a phase of the question this is, and how its solution has and is taxing the skill and wisdom of both legislators and physicians in the old world, as well as in the new.

Thus, whether we view the question from an economic or humanitarian point, it demands serious attention, and even if we have no care for the criminal, let us have care for ourselves and our children, and study this question of crime and criminals, earnestly, honestly, and intelligently. We can hardly advocate at this day the killing of the criminal, although I have sometimes thought, in studying their treatment in some of our jails and prisons, that, if such was not the avowed purpose, it was practically the result, and in this statement I do not overstep the bounds of sober truth, of which you could easily satisfy yourself by examining the sworn testimony as to the treatment and condition of the convicts in more than one of the Southern States, and, I bow my head with shame to say it, even in some of the jails and prisons of our own State.

The treatment of the convict, from a sanitary point of view, may be considered in two respects:

1st, As to its effect upon the convict.

2d, As to its effect upon society.

I shall consider the question only so far as it relates to the convict, and even here only so far as the sanitary arrangements of our prisons and jails may affect the physical and, through it, the moral well-being of the prisoner.

I think I can safely state this as a correct principle, that, if all men had perfectly sound and well-balanced minds in perfectly sound bodies, crime would not exist. Under these conditions, reason would hold its easy sway and teach the passions the folly of their wildness, and an enlightened conscience would lead men into the paths of virtue.

The penologist and the physician more and more rec ognize the truth that crime is often the result of disease, and that the convict often needs the physician more than the lash, and this idea is becoming better recognized, and its influence is being felt in the modification of our laws and in the treatment of our convicts, and year by year the barbarities of the past are giving way to more enlightened views and a wiser policy.

The old Latinist thought wisely when he penned the words: "*Mens sana in corpore sano.*" He had studied society with profit. A basket of food to quiet the pangs of hunger, and covering to shield from the blasts of winter are more powerful missionaries than the most elegant homilies. Soap and civilization are hand-maidens, and the soap comes first. A quaint writer has formulated this into an equation that represents a great social truth; he says:

Let a = the degree of civilization,

s = the amount of soap used,

p = the population, then

the degree of civilization of a people may be represented by the equation $a = \frac{s}{p}$, in other words: "The degree of civili-

zation of a people is equal to the quantity of soap used, divided by the number of the population."

Go into any prison or jail, observe the inmates, their pale, haggard faces, their dejected countenances, put your finger upon their pulses, you will find that they do not throb with the rich red blood of a noble and healthy manhood; you will find rather that they speak the well-known language of neglect, want, disease of ill-ventilated, ill-lighted homes, where the light and air that God gave as an heritage to all his children, has been shut out by the cruelty or avarice of man; look into their soulless eyes, from which has fled even the inspiration of hope, or from which leap the wild fires of ungoverned passion; look at their ill-shapen heads, which tell the sad, sad story of generations of neglect. Then examine their narrow cells, where the light can scarcely penetrate; take a good, long sniff of the sickening odors that hang about them, like the pall of hell, and pronounce an eulogy, if you can, upon the enlightened and Christian policy of your Christian States. Tell me if this is the treatment that is to save the criminal, or protect society. I have sometimes thought in studying this question, if the State had been ingenious in its methods to create criminals and crush out of the convict every possibility of reformation, that in the spirits of its laws and in their execution, it could not have been more successful, and I here remark that, bad as our systems are, the practical execution of our laws in this regard is worse.

It is now generally recognized as a truth that the State is better protected by seeking to reform the criminal than attempting by blind force to crush him into obedience. The latter plan has entirely failed; the former, wherever tried, has been full of success, and the more successful, the more clearly this idea has been kept in

view, and carried out by wise legislation, and a careful execution of the laws in conformity thereto.

Returning to my text, "A sound mind in a sound body." Mental health and bodily health are very closely allied; it may almost be said they are inter-dependent. You, gentlemen, as physicians, know how true this is. Trace crime back to its genesis, and you will find behind a very large percentage of it lies poverty, neglect, and want, and following in its train the thousand and one diseases, bodily and mental, that curse the world. For this condition of things, the state is much more largely responsible than it may be willing to admit. Its unjust and unwise laws have driven many into crime, and its criminal neglect, barbarous and cruel treatment have prevented reformation. As the state has sown, so must it reap.

The great mass of our criminals come from the lowest class, from that part of our densely populated cities where, as in this city, six hundred thousand are packed within the compass of a square mile. Go into their houses; see how bereft they are, not only of every comfort, but almost of every necessity of a healthy existence; see how death decimates their ranks, how even the decencies of life are impossible, and you will not wonder that crime finds here its recruits, but, rather, that all do not become criminals. As in the elevation of this class the first thing to be sought is the bettering of their physical condition, so is it in the reclamation of the convict, and, through it, the protection of the state. One of the first cares is the treatment of the body, and here is where the sanitary condition of our prisons and jails touches every class of society, from the palace to the hovel, from the prince to the meanest of his subjects. If we are to reform the criminal, you must build up his body to a vigorous manhood. You must eradicate the taint which,

perhaps, has been poured into his veins through generations. You must study crime from its medical side, and see if it should not be treated more as a disease than as a vice; and when these views become potent, then the question of sanitation becomes one of the most important, not only as to the homes from which the criminals are recruited, but the homes to which the violated law consigns them, as we urge for treatment, and not for death. An examination as to their treatment in many of our prisons and under some of our systems will satisfy the most incredulous that it is to death they are in fact consigned, and when they pass through the gloomy gates the words that Dante wrote over the gates of hell may well apply to them: "He who enters here leaves all hope behind." Under the treatment practised in the State of Kentucky, as shown by the report of a committee of the Senate of that State in 1882, in some instances the death-rate was twenty per cent. Are you startled by these figures? If so, go into some of the jails that to-day are to be found in this State, and you will not be surprised that it is possible. This conditions of affairs should awaken all to a sense of danger of the evils that are pressing upon us, even if it did not touch our hearts with a feeling of human sympathy for the two hundred thousand men and women, youths and maidens, boys and girls, yea, of little children, that at this very moment are confined within prison walls in these, our great commonwealths, sixteen per cent of whom are under sixteen years of age.

The same sanitary conditions that are necessary to health without the prison are equally as necessary within it—light, air, healthful food, and some occupation for body and mind—and there is not to-day within the precincts of this great State, so abundant in its wealth, so generous in its charities, a single jail in which these conditions are fulfilled, and I wish it to be understood that this is only a

statement of the exact truth. If any of you medical gentlemen had a patient who was ill, you would hardly look for his recovery if all of these conditions were violated. This is not only true as to our jails, but it is, to a very great extent, true as to our prisons and penitentiaries. Not to burden you with evidence, I make a few quotations as to the prison at Sing Sing from the report of an investigation made in 1876, upon sworn testimony. I quote as follows from the testimony of Dr. Geo. H. Fisher, as contained on page 397 of the Report: "The upper cells in this prison are not fit for a human being to occupy; the ventilation is very bad, and ascending from one gallery is another; it is always tainted as you go up; . . . the main hall has *never* had the necessary ventilation, not the necessary cubic feet of air for the number of convicts confined there; the little hole in behind, that professes to be a ventilator, would be alive with bed-bugs, and the convict would stuff them with rags to keep them from coming down; the female prison needs air, but it is infinitely superior; often during summer nights, three-fourths of the windows are closed; I don't believe that one-fourth of them are open, and in the morning, there is a stench that is almost unendurable." Dr. Fisher was for twenty-five years connected with this institution, and for two and one-half years prior to his testimony one of the physicians.

Page 301, from the testimony of J. C. Harris, one of the employees, I quote as follows:

"I have seen times here when nearly all had the cholera; there was a great deal of diarrhœa, and we came down to open the cells; and I have had to hold my nose after going and unlocking a gallery for the convicts to come out of their cells, the stench was so terrible."

This is one of the largest prisons in the State. I believe that since this report was made, the evils have, to a slight

extent, been corrected. The sanitary condition of the other prisons in the State is about the same as at Sing Sing. I might accumulate evidence upon this point to almost any extent, but the quotations given are sufficient for my purpose.

If the sanitary condition of our prisons is bad, that of our county jails is tenfold worse, and it may be safely stated that it is but little better than it was in the English jails in the time of John Howard.

There is scarcely a single sanitary condition even moderately complied with. Our jails are a disgrace to the State—a disgrace to our civilization—they are schools of crime and colleges of vice. I speak thus strongly and from personal observation as to a great number of them. A few years since, under the auspices of the Prison Association of this State, I made an inspection of a number of our jails. I well remember the one at Rome. It was a clear, bright October day that I was there, and as I walked through the streets of that wealthy city, the crisp fall air sent a thrill of pleasure through every fibre of my body; but how changed the scene when I entered the prison walls! The main corridor of the jail is about twenty feet by thirty-six, with two tiers of cells opening upon it; the windows were high, and even on this day did not admit sufficient light to read with ease the New York *Tribune;* the cells were small, scarcely ventilated at all. In one end of the main hall was the privy for the accommodation of the prisoners, and although the prison at this time was not full, the stench was almost unendurable; what must have been the condition of this jail in winter when, as the keeper told me, there were often confined, for weeks together, from fifty to sixty prisoners, and, at times, two, and even three, were crowded together in a single cell, about five by eight feet. At the time I visited it, there were confined there for minor offences two or three lads under

fourteen years, and, at times, as many as five or six of this tender age were in confinement, and commingling with old and hardened criminals. How is reformation or health possible under such conditions?

This jail, however, is no worse, and not as bad as many another in this State at this very time. If time would permit, or your patience bear, I could accumulate the evidence upon this point to almost any extent, and stand ready so to do if my statements are questioned. Does it not seem strange that in a State that calls itself civilized and among a people that claim to be Christian, such a condition of affairs can be tolerated?

This whole matter may be truthfully summed up as follows: that almost without exception the jails of this State are wanting in almost every proper sanitary provision, and are conducted with a total disregard either of the health or reformation of the convict, and it seems to me that even if we cared not for the convict, our regard for society and our own safety would awaken such a feeling of indignation that would compel the public authorities to correct these gross iniquities; and the importance of this question is increased if you will bear in mind that the aggregate jail population of this State is at least 140,000 a year.

There is another aspect of this question that should appeal especially to you as physicians, that is, the very close connection between disease and crime. It would not be difficult to establish that a very large percentage of crime is the result of privation or misfortune; insanity and poverty are often mutually connected in the relations of cause and effect.

The progress of medical science of late years has given greatly additional support to claim for humane consideration, which is based on this view of the subject. It is the *union* of bodily and mental imperfections which constitute at once the surest test of pitiable disease, and the most

reasonable and reliable security against false or suspicious allegations of irresponsibility.

Yet such a union is so frequent a characteristic of the inmates of prisons as to be a constant subject of comment in the reports issued by the medical and other prison officials.

Permit me to call your attention very briefly to a few authoritative statements upon this point, which, from the high character and long experience of those who make them, ought to have great weight.

Dr. Thompson, resident-surgeon of the general convict prison for Scotland, at Perth, in a paper on "The Hereditary Nature of Crime," issued 1870, states as follows: "I have visited the great prisons of England, Ireland, and Scotland, and in all these the authorities, governors, chaplains, surgeons, and wardens concur in stating that prisoners, as a class, are of mean and defective intellect, generally stupid, and many of them weak-minded and imbecile." He also says: "Intimate and daily experience for many years among criminals has led me to the conviction that, in by far the greater proportion of offences, crime is hereditary," and adds that this hereditary or congenital tendency is, in most cases, associated with some bodily defect, such as spinal deformities, stammering, imperfect organs of speech, club-foot, cleft palate, deafness, congenital blindness, paralysis, epilepsy, scrofula.

Dr. Wilson, in a paper read before the British Association, in 1869, on "The Moral Imbecility of Habitual Criminals, as Exemplified by Cranial Measurements," said he had "measured and examined 460 heads of such persons and, from the observations made, he had no doubt that habitual criminals were cranially deficient, especially in the anterior lobes of the brain." And further: "The cranial deficiency is also associated with *real* physical deterioration; forty per cent of all the convicts are invalids,

more or less, and that percentage is largely increased in the professional thief."

Dr. Wm. Guy, Secretary of the London Statistical Society, and one of the most competent authorities on this question, who tabulated the judicial statistics for thirty years, arrives at the following conclusion: "The criminal population contains a much larger proportion of insane members than the community," and says in 1869: "We have at this moment within the walls of Millbank prison upward of two hundred convicts so unsound in mind as to be deemed fit occupants of special wards, and yet not deemed *quite* fit for the lunatic asylum."

Visit any of our prisons, and I think your own observations would justify these remarks.

The Massachusetts Commission on Insanity, in 1854, reported: "We find that the pauper class (and from it come our criminals) furnish in the ratio of its numbers sixty-four times as many cases of insanity as the independent class."

This view of the subject is so important and so potent as operating on the criminal classes that at least a single paper should be devoted to it, and I only refer to it to intensify not only the importance, but the necessity of better sanitary provisions for the convict.

Then consider the question from the point of view as to the heredity of crime, and it is equally important and alarming, and is attracting more and more the attention of the penologists and humanitarians. I cannot enter into any lengthened discussion of this point, so as to base an argument upon it for the better treatment of the criminal and better care for his bodily health, but cannot refrain from making a few extracts from a paper by Mr. R. L. Dugdale, of this city (published in 1876), one of the most thorough, careful, intelligent, and conscientious students and writers on this subject that we have. He made a personal examination as to the history of a criminal family in this

State, tracing it back since 1720, both in the direct and in the collateral lines, with a view of ascertaining to what extent crime is hereditary, and what was the influence of marriage of criminals into families not criminal; the paper is one of very great interest, and has attracted attention both in this country and Europe. Tracing for several generations in the direct line, seventeen out of the forty-nine descendants from one criminal ancestor were criminals, had been convicted of crime and imprisoned; and in regard to this family, he says: "The further this investigation has been pursued the more completely the links of social vices, pauperism, ignorance, indolence, and crime visibly appear as a chain that has dragged a thousand persons in one great kindred group, down into a worse than bestial degradation, and bound an enormous burden upon the tax-payers of the county, and fixed in several towns the most deplorable of personal and moral nuisances." Pardon me a single quotation more, from that admirable book by the Duke of Argyle, entitled "The Reign of Law," in connection with hereditary influences, viz.: "The body and mind are in such close relationship that congenital habits of body are sure to be connected with congenital habits of mind. But we forget how often these laws of inheritance must be working invisibly where they never break ground upon the surface, and thus it is brought home to us; how the mind may be subject to laws of which it is unconscious; how its whole habit of thought, and the aspect in which different questions present themselves to its apprehension, are, in a great measure, determined by the mysterious forces of congenital constitution." How many a criminal career, and how many a sudden outburst of violent crime, in persons whose previous conduct has been decorous, may have originated in these "mysterious forces of congenital constitution!"

The more extended study and investigation one gives

to this subject the more clearly the fact will appear that disease lies at the basis and is the genesis of by far the largest percentage of crime, and that these poor and friendless outcasts who are the pariahs of society, and against whom almost every man's hand is raised, should be treated by the physician and not turned over to the cruel and heartless treatment of the jailer, shut up within prison walls where every condition of health is violated, a cure made impossible. Is it a wonder that these poor creatures, when released, turned out again to prey upon society; should feel that their hands should be raised against every man; that they should become the wild Ishmaels of society, carrying into it the blackness and desolation of their own sad lives?

And now, thanking you for your kind attention, I will bring this paper to a close, hoping, however, that, desultory as my remarks have been, I at least have succeeded in awakening in your minds a deeper interest in a subject that touches more closely the welfare of the State, and the peace and happiness of our own homes, than from a cursory consideration of the subject might at first appear.

On motion a vote of thanks was given to Mr. Kitchell for his interesting and valuable paper.

Professor I. L. Rice, of Columbia College, being called on by the chair, spoke as follows: I am in hearty concurrence with the general tenets of the paper. I think it is an outrageous procedure on the part of the state to think, as I expressed it in an article, recently written, that the better part of society has only to leave the worse part to its destruction, in order that the whole may become healthy! This is fallacious, for a society which has diseased outgrowths, is for that very reason not healthy; a far better and sounder way is to improve all. Under the censured plan they killed and tortured criminals, and treated him as an enemy to society; dynamite and revolution are the outcome of this spirit, and to attempt to eradicate the diseased part in this case by killing the diseased part will necessarily result in the death of the whole body. It ought to be our aim to make good citizens of the crim-

inals, and, as Mr. Kitchell says, their bodily welfare is an important condition of such improvement. All prisons should become reformatories, and a healthy rivalry among the various institutions in this sense will lead to cultivation of the best plan.

The idea of the heredity of crime is as ancient as history. Plato, twenty-three hundred years ago, urged this point, and knowing it, it is criminal negligence on our part to ruin ourselves as we are doing, by letting matters go on as they are going on to-day.

Dr. Spitzka: I cannot altogether agree with the reader of the evening and the last speaker, though I am very desirous of expressing my admiration of the literary excellence and high humanitarian aim of the expressions we have heard this evening. No one can for a moment question that disgraceful cruelties are practised in our jails to this day, that the prisoner is entitled to the hygienic comforts which we are able to give him, that the association of young criminals with old and hardened adepts in crime is indefensible on any ground, but there I think we should pause. The criminal has deliberately performed an act which he knows society for some reason or other—which it is not for the individual to question—has attempted to interdict by affixing to it a certain penalty. He deliberately takes the risk of that penalty being imposed on him, and no one will question that, in the vast majority of cases, the criminal has freedom of choice. Now it seems to me there is little room for sentiment here. If we turn our prisons into hotels we shall add to instead of subtracting from the sources of crime; vagabonds usually know which prison to select when they want comfortable winter quarters, they do not select the one with the worst food, ventilation, and sternest discipline. To some extent our relations to the criminal classes are those of war. The hand of the criminal is raised against society, and the strong arm of the law is in return placed on the criminal. We should temper severity with humanity, and in so far as I believe that whoever assists in a cruel spectacle, reads of it, or directs it, is made thereby so much worse a man, I fully indorse the conclusions of the paper. But I cannot go as far as to recommend that the criminal should be *better* housed, clothed, fed, and instructed than our honest tenement-house population. That brings me to another question, the relation of unhygienic surroundings to crime raised by Mr. Kitchell. I do not believe the relation is so absolute as he claims. True, crime is usually poor and herds together in the poorer quarters, but I will show him whole blocks of our tenement caravanseries in which a crime is unknown the year round. It is not so much sewer gas nor in sufficient diet that

make the criminal, but heredity, bad associations, and drink among the lower classes, and something else, worthy of faithful study among the so-called higher classes. Mr. Kitchell will certainly not claim that Sunday-school superintendents, bank presidents, church deacons, cashiers, clerks, and clergymen are brought up under unfavorable hygienic circumstances, and yet I think those who are attentive readers of the daily journals will agree with me that crime and avoidable crime is much more common proportionately among those of these professions than among trades people, and that their crimes are of a blacker complexion morally than those committed by the laboring classes.

Of the great and growing importance of the questions raised by Mr. Kitchell there can be no doubt. But if any measures are to be suggested for the improvement of the race as a whole—as Mr. Rice has it—they must take into account the hereditary nature of crime, and we shall either have to leave the matter entirely alone, or stop the criminal's breeding his kind. There was a suggestion made some time ago to castrate all criminal lunatics and syphilitic subjects, and while I am far from entertaining any idea whose very ferocity defeats its purpose, I yet must say that it is at least better aimed at the root of the evil than many of the more popular suggestions of the day.

Dr. Harwood: I think much of the underlying trouble is to be sought for in defective modes of education, and in part in the careless management of charitable institutions, which always must bear a compensatory relation to correctional institutions as preventatives of temptation to crime. To give you an instance, I knew a widow of a soldier of the late war with a family of small children; she was an energetic woman, but compelled to apply to charitable institutions for relief. She was turned away from one after another; this one had such a condition of admission, that one, some other; here only persons of a certain class, there only persons of a certain other class could be received, in short it was nigh impossible to procure admission to a very deserving subject anywhere. It seems as if many of the institutions with high-sounding names are really erected for the accommodation of pompous and well-salaried officials, and that little real benefit is accomplished by them.

Mr. Avery: With your leave I will state my observation of the transmission of mental qualities from parents to children. Insanity, idiocy, and crime are the noted ones applicable to our theme. The serious remedy suggested for purifying the blood of

families would not avail; others, besides the insane, idiots, or criminals, beget the unfortunate and wicked.

Henry Clay, the great Harry of the West, begat two sons that became insane in early life and never recovered. Major Buford, a superior man, noted as a brave warrior in the Revolution, and for tilts with Tarlton in South Carolina, a descendant of the Earl Buford stock of England, a gentleman of large means and of pure life, and the father of three children of first-class intellects (one a son who graduated with second honors at Yale, another about his intellectual equal, and a daughter, the peer of the purest and wisest of women) begat upon the same mother who bore those noble children three other sons all idiots, and idiots of the lowest class. Again, Gen. Shelby, an honored man, begat a son who was naturally a bad man, and who finally committed a murder of pure maliciousness. He was tried and convicted. Here a question was raised by some member as to the application of such remarks to the paper read. Mr. Avery answered that young Shelby was put in jail; but he was not satisfied with the treatment he received there—the close confinement, bad air, and worse food—so he got out of the jail into the pure open air and left for parts unknown. That was the healthiest and safest thing he could do, as he would soon have had the *diphtheria* in a fatal way, if he had not left. No doubt, you have all heard of Miss Sallie Ward. The Ward family was an ancient and good one. However, George, after good, careful training by a good father and mother, was a bad one. He shot Percival Oldershaw at Paris, Kentucky, after a dance, because he danced in a cut-away, instead of a dress-coat. The pistol ball lodged in the skull of his victim in such part as not to be fatal. The jail was so unwholesome to George, his kind father paid $15,000 to Oldershaw to let up, so that poor George might have the benefit of pure air. Miss Sallie's brother, and cousin of George, was also a bad one. He finally wantonly shot and killed a school-teacher, by the name of Butler, a nephew of a whilom candidate for the office of Vice-President of the United States and a very estimable young man. Ward was put in jail and tried twice for the murder, with a disagreement of the jury each time. But the jail was so foul, the air so close, and the fear of diphtheria so great, that by some means he got out into the free air of heaven and left for parts unknown. It was fortunate for him that he did, for he might have come to a sudden death if he had not. A jail is a bad place for soul and body. There was no known mental and moral taint in either family. It would have been a great comfort to both the Ward and Shelby families to have known that these

young men were not criminals, but only sick persons. The converse can be shown from families in the same neighborhood.

What a beautiful proposition! Crime is only inherited disease! Jails and prisons should be at once converted into hospitals! What a noble field for philanthropists and physicians! An electric light upon a phase of humanity heretofore in deep darkness! One cheer more for the nineteenth century! I was delighted, entertained, and instructed by the paper read and its novelty, and by the eloquence and enthusiasm of the spirited reader, and am sorry there were not more doctors to have heard it

As to one fact stated, I will say that in one jail, where the sexes were carefully kept separate from each other, a female prisoner became pregnant. If a doctor had been the jailer, it would not have happened. The State would not have been cursed by such a tainted offspring. Make physicians jailers! That seriously I favor.

Disease has grown like a tumor lately. Insanity is, without question, one. A variety, as lawyers say, that is settled. Now, criminals are no more criminals, but only sick persons. Crime and criminals are to be obsolete terms.

If the doctors can cure this epidemic that, like a dark pall, is over the race, they can excel infinity. Theologians say God indited the early history of the race. If he did, he tells us he tried a flood; but no sooner had his best man touched solid ground than he planted a vineyard, raised grapes, made wine, got drunk, stript himself naked, and cursed his son for being ashamed of his acts. Then the All-wise said it was of no use, he would not try water again. He tried fire in a small way; but Lot, his best man, it seems, carried away some ardent spirits, or soon made some, and he and his daughters continued to live like Sodomites. Fire was not tried again. What the Supreme Being did not accomplish by water and fire, is to be done by blue pills. For the Wards and Shelbys, and the like, a blue pill from a pistol or rifle would be best. Physicians certainly will have a wide and noble mission if they accomplish a cure for the diseases now called crimes. Law and theology will become mere matters of the past, and the millennium will have come.

Physicians can try, and they may at least accomplish more in the way of criminal reform than preachers. Let it be done early before the criminal classes shall have been drawn into the meshes of law, and into the hands of bad associates. The medical profession is of inestimable value in the physical sphere, but here is presented a brilliant way into the moral one, and may God add

his blessings, so that in it they may be more successful than theologians have been.

Dr. C. S. Wood: I am delighted with the paper in many respects, and disappointed, but agreeably so, to find for once that lawyers do not always try to punish instead of reforming. One would think that Mr. Kitchell was a physician, and I think nature intended him to be one. There can be no doubt that much of crime is due to organization, both are hereditary, those living in our tenement house districts have no hope of a better existence here, and believe that they cannot be worse off if they commit crime. I think that physicians know a great deal about crime and its purlieus. At least one-third of our time—certainly that is my experience—is spent in attending to the poorer class without recompense, and those here present may form an idea of the physical and moral atmosphere in which the children of this class grow up, when I say that their mothers often fail to call in a physician when their infants have cholera infantum, because, to use their own words, their children when they are taken ill "go off like snuffing a candle and are saved a life of crime." I think children should be separated from such associations and put to various vocations. This was done and found feasible in Greece after the great wars against the Persians. Pericles employed them as shipbuilders and seamen who built and manned a fleet superior to any in the then world. And Louis Napoleon took a step in the same and correct direction when he tore the crooked street quarters down, furnishing broad avenues for the admission of a better air, and exercise and occupation to thousands.

Mr. Eller: The discussion, I think, has strayed somewhat from the direct path, owing doubtless to the fact that while Mr. Kitchell has promised us a paper on "Prison Sanitation," he has, besides devoting much of his paper to that subject, also very eloquently spoken of the pauper and criminal classes *outside* of prisons. Prison sanitation is the science of applying physical and moral hygienic means to prison life, and within this limit only should the social side of the questions brought forward to-night be considered.

I have been a prisoner in a jail myself once, devoid of even the most rudimentary sanitary conveniences. Fortunately my incarceration, which was due for an alleged contempt of court, regarding which I became an appellant to a higher court, the judgment of the lower court being reversed, lasted only twenty-four hours. There were no provisions for cleanliness, the prisoners removed the refuse themselves, and did so or not, as they saw fit; there

was one sink at the end of each corridor for washing, and recollect this was only a jail where people not guilty of heinous crimes were immured ; but it is the same thing, too, in our penitentiaries and State prisons.

I should have liked to have heard the reader discuss the influence of different penal systems on mental health, for example, of the single cell system.

Dr. J. S. Wight : This question is one of immense importance, it reaches all classes and states, and affects numberless interests. It has on a previous occasion been brought to our attention how in the past we treated the lunatic worse than as a criminal, and progressing civilization alone has lifted off the stigma and suffering from this unfortunate class who, instead of being left to the mercy of the jailer, are placed, as they should be, under the care and treatment of physicians. What has been done with inebriety? Is not this condition treated to-day more humanely, scientifically, and on broader grounds than heretofore? I think a higher civilization will treat the prisoner the same way. I think the prisoner is the result of an abnormal development, and all my reflections and observations lead me to this one general conclusion that the criminal is a sick man. As such, if he is to be put under the physician's care, the sooner this is done the better, and I am glad that such a conclusion has been arrived at by a representative of the New York bar.

Mr. Livingston : I have no desire to add anything to the discussion, but feel a need for enlightenment on some points. Satisfactory as the paper has been in most respects, it disappointed me to this extent, that it did not point out means for improvement. I dislike general indictments, they irritate but do no good; on the whole there has been as much reform in jails as in any other direction made during the last hundred and fifty years. The best thinkers have devoted themselves to this question of the amelioration of punishment and the proper treatment of the prisoner. Humanitarian advance, in relation to prisoners, must stop somewhere. After all the criminal is a criminal. He is weak in not restraining desires that bad people have *outside* of jails. Not all the bad are in, nor all the good out of jails, and if the doctors are to have charge of the people in jails, they must meet us with more definite propositions than have been announced to-night. It seems to me that when once the individual has taken a false step, he cannot redeem himself, and it is found to end in crime. The foundation of the whole question is an educational one, and the sweeping statements made about heredity must, so it

seems to me, be taken *cum grano salis;* for the argument of heredity, if carried far enough, would excuse all crime. There are people who suppress by their will and education criminal tendencies. The question is how far good surroundings and education may neutralize heredity.

Mr. Kitchell, being called upon to close the discussion, said: One thing which particularly gratified me was the interest awakened on the subject. Dr. Spitzka, who partially agrees with me, said some things with which I cannot concur. Although he does not recommend castration, yet he does not appear to be altogether disinclined to advocate some such expedient, and then the question would come up whether those who propose to castrate can really tell who will be or who is the worst or the best man.

What is crime, how does it come? Authorities everywhere admit that it is a disease, the outgrowth of generations of diseased minds. Now how does New York treat its hundred and sixty thousand criminals; need I remind you of recent revelations?

Sanitation applies not only to physical but to the mental welfare of jail-inmates. I must confess that I strongly indorse the Belgian prison reform. We place persons with diseased bodies and minds in narrow quarters, where neither light nor air can penetrate, devoid of every decency, and then ask that after months and years of a life spent in such a medium, they shall go out and have a good influence on their relations and others. If we take this into account, we touch the very spring; the very conditions of physical and mental health are violated on every hand in our jails, and I ask your influence to go forth and erect a public sentiment which shall render such disgraces, as those we have all agreed upon to-night to be such, impossible.

After the conclusion of the discussion, it was moved by Mr. Eller, and seconded and carried that a committee of five, with Mr. Kitchell at its head, be appointed to consider and to report to the Society on the subject of the paper on "Prison Sanitation" read by Mr. Kitchell. The chair then appointed as members of the committee Mr. Kitchell, Dr. Wood, Mr. Eller, Mr. Livingston, and Dr. Spitzka. By motion, the President of the Society was made an ex-officio member of the committee.

A communication was then made by Dr. Jacobus who read a decision recently given by Judge Lawrence concerning the question whether the city should be held responsible for the action of an insane person who had been discharged by a judge or sheriff's jury. Moved, seconded, and carried that the article

and editorial of the paper from which this was taken be filed and deposited in the Society's archives.

Dr. Spitzka then offered the following: Resolved, that those members of the New York Medico-Legal Society who shall comply with the ordinary requirements of membership of the Society of Medical Jurisprudence and State Medicine shall not be required to pay an initiation fee, but merely the current dues up to Sept. 1st, 1884. The resolution was seconded, but was ruled by the chair out of order, as being opposed to the provisions of the By-laws.

The Society then adjourned.

Sixth Regular Meeting, June 14th, 1883.

The sixth regular meeting of the Society of Medical Jurisprudence and State Medicine was held on the evening of June 14th at the Academy of Medicine. The meeting having been called to order by the President, the minutes of the last meeting were read, and ordered adopted with the correction offered by Mr. Avery to designate him President instead of Chairman of the Board of Trustees.

The report of the Board of Trustees was then offered by their President. They reported as follows:

To the officers and members of the Society of Medical Jurisprudence and State Medicine.

The Board of Trustees report as follows:

June 14th, 1883.

First.—The next meeting of this board will be at the house of E. H. Benn, Trustee, 574 Lexington ave.

Second.—The worthy secretary of this board has procured from the Secretary of the State of Pennsylvania the accompanying act "An Act relative to the Supervision and Control of Hospitals or Houses in which the Insane are placed for Treatment or Detention," and approved the 8th day of May, 1883, and presented the same to this Board. The Board acted upon the same and present the same to this Society as worthy its consideration and recommend action by it thereon at this meeting.

Third.—At the September meeting a paper will be read by E. H. Benn, Esq., a member of the New York Bar, Subject—"Intoxication, it legal Effects and Consequences."

By order,

GEORGE P. AVERY,
Pres. of Board of Trustees.

Reported as recommended for election, C. W. Moulton, Esq., Tribune Building, and C. P. Shaw, Esq., 206 Broadway.

It was moved, and seconded, that action on the recommendation of the Board concerning the copy of the act of the State of Penn. relative to the supervision of insane asylums, etc., obtained by their secretary, be laid over until the consideration by the Society of new und unfinished business. Carried.

The election of active members then took place, it having been moved, seconded, and carried that both candidates, Messrs. C. W. Moulton and C. P. Shaw, be balloted for on one ticket. The result of the balloting was a unanimous election of both gentlemen.

It was next moved and seconded that the Secretary cast the vote of the Society for T. Gallard, M.D., Paris, France, and Dr. von Krafft-Ebing, Graz, Austria, for honorary membership. Carried. The Secretary thereupon cast such vote and the gentlemen named were declared elected honorary members.

Dr. E. C. Spitzka then read the paper of the evening entitled "Spinal Injuries as a Basis for Litigation."

SPINAL INJURIES AS A BASIS OF LITIGATION.

BY

E. C. SPITZKA, M.D.,

Professor of Medical Jurisprudence at the New York Post-Graduate School, Author of a work on Insanity, etc.

In developing devices for rapid travel and transportation, man has certainly outstripped the enduring power of his organization. He has constructed engines whose potency to do harm to the body far outweighs the resisting power of his anatomy, well-adapted though it be to protect him against the emergencies of ordinary active and passive motion. The degree of violence to which he, in his natural state, was subjected; aside from the accidents of war and hunting—rarely exceeded that of his own muscular power; and the numerous joints, elastic cushions, membranous and fluid protectives of that important organ, the spinal cord, undoubtedly sufficed to guard it against any jolt, jump, or blow not exceeding that degree. But

when man drafted into service animals for his carriage whose speed and power exceeded his own sevenfold, he exposed his nervous system to injuries which strained its conservative forces to the utmost, and as many a tragical case attests, often snapped the thread of health, if not of life. More recently he has placed under his subjection forces which exceed a hundred and a thousand-fold those whose injurious effects his organism was calculated to meet. Steam carries the creatures of modern civilization across the land, accomplishing distances in a few hours or minutes, which formerly required days to traverse, and elevators transport them in a twinkling to the tops of our caravanseries and to offices, located near the steeple-high roofs of our down-town architectural anomalies. A little too much alcohol in the brain of an engineer, somnolence on the part of an overworked switchman, or wear and tear of an elevator rope, and the instruments of civilization become engines of destruction, of disease, and of death.

Most of the injuries resulting from railway collisions and the falling of elevators lie within the domain of ordinary surgery. When a bone is broken, an eye gouged out, or the scalp cut, there is little room for discussion and dispute, the facts are so palpable that neither the sophistry of railroad lawyers, nor the affidavits of doctors can argue them out of existence, as little as fraudulent assumption can create them. It is different, however, with a class of injuries which are, from a medical point of view, to be undoubtedly considered the results of the same class of accidents and which, constituting a frequent basis for litigation, merit our thoughtful attention in the interest of medico-legal truth.

There can be very little question indeed that speculative actions are frequently based on the erroneous allegation of spinal disease after railroad collisions and similar accidents. And there is little question in my mind that,

even where an injury has been done, its results are often magnified or perverted, in order to overbalance the denial of defendants on the false principle that the best antidote for one lie is another. The spectacle of a suit for damages based on alleged disability from spinal disease, as we have witnessed several during the past decade, is an humiliating one to the friends of both professions. In more than one case has the battle been fought without the limits of the court-room by medical and legal detectives, manufactured affidavits and suborned spies, and within it by professional mendacity. On the plaintiff's side we have seen lawyers and physicians exaggerating the results of a spinal shock, with the pocket gaping for a contingent fee unpleasantly visible. On the defendant's side we see the legal and medical agents of a monopoly, who deny the most palpable diseases, and even go so far as to exclude the very possibility of railway injury to the spinal cord, as if, forsooth, the human frame had accommodated itself by a species of natural selection to its artificial environment, and its ligaments and nerves had undergone evolution into india-rubber. A neurological humorist might argue that there was a grain of truth in this theory, for, judging from the fact that suits for spinal injuries are common in Brooklyn and rare in New York, he could argue that the suburban spinal cord had fallen far behind the metropolitan one in the struggle for existence, in this age of railways and steamboats.

It is the belief of physiologists to-day that the functional activities of the nervous system are determined, maintained, and modified by molecular changes which neither chemistry nor the microscope have as yet revealed the precise nature of. It is also an admitted fact that all injuries, particularly if due to the action of a vibratory force, are capable of arresting or perverting these functions. With theories law has little or nothing to do. For science it suffices

that the physiological theory and the observed facts harmonize. It would be little less than a miracle if so complex an organ as the central nervous axis, with its soft tissues, its countless interlacing conducting tracts, its myriads of delicate nerve cells and their tender off-shoots should not suffer some disturbance, in a collision which telescopes heavy cars, plows up the soil like an earthquake, crushes powerful engines into an unrecognizable mass of metal fragments, and grinds steel and oak to splinters. It is indeed surprising that more severe and extensive injury is not always done to flesh, bone, and nerve than the coroner and surgeon are called upon to examine.

The great difficulty under which both the legal and medical gentlemen, connected with the trials growing out of real and alleged injuries to the spinal cord, labor, seems to be a belief on the part of the plaintiffs that it is necessary to prove the existence of coarse organic disease of the spinal cord and its membranes in order to convince a court or jury that damage has really been done. On the part of the defense, a similar impression prevails, and is aided by an excessive zeal to prove simulation on the part of the plaintiff. In order to clear up the medico-legal aspects of the question, permit me to recite a few of the incontestable facts of medical observation, pertinent to this subject.

Violent concussion of the nervous axis may produce instantaneous death, although no evidences can be found in the dead body to explain its occurrence. The fact is there. We can only assume that the molecular arrangement has been shaken to a degree exceeding the limits of viability; just as in the case of strychnia or conium poisoning, where, although respectively the most frightful spasms, or the most profound paralysis, indicating a grave disturbance of the nervous functions, precede death, no structural evidences of their action can be found; or as the most violent

storm may sweep across the mental horizon without leaving a material trace in the brain of lunatic.

It is, I may venture to say, the growing belief among those who have faithfully studied the subject that most so-called organic diseases of the spinal cord are preceded by a stage in which there are no anatomical changes discoverable by our present methods of investigation. I feel convinced that this applies to so-called spastic paralysis, to locomotor ataxia, and to some cases of multiple cerebro-spinal sclerosis. If this be admitted, there is nothing strange in the fact that a profound shock to the cord which, as just stated, may have death as an immediate sequel, may, in those who survive, lead to chronic degeneration of that organ and its membranes; and indeed, whatever premises we may start with, and whatever reasoning we may employ, the empirical observation proves that such degeneration, entailing paralysis and other serious ills, does result from spinal shocks. However, gross disease of the spinal cord, such as hemorrhage, myelitis, or compression, will rarely become the subject of litigation. Few of the subjects of these disorders, if these date from a railway injury, live long enough to bring a suit; of the remainder, still fewer survive the suit, and if they do, the character of their disorder is usually so plain that its existence cannot be gainsaid.

There is a class of disorders following violent spinal concussion which have called for much more attention than the clearly tangible disorders just referred to, and whose technical discussion I will here waive for reasons which must be obvious to all of you. I refer to spinal ir ritation. This disorder, from the mere fact that it is not necessarily fatal, that we know nothing of its morbid anatomy, that it is as protean in its manifestations as hysteria, and as difficult, if not more hopeless to treat, has been the *bête noir* of neurology. And yet it merits the careful at-

tention of physicians on account of its differential diagnostic, and of lawyers on account of its medico-legal relations. It is the same disorder which, when due to concussion in railway accidents, has been unhappily termed railway spine. Nearly all the cases described by Erichsen, in his celebrated work on concussion of the spine, are of this character, and do not belong to the group of meningitis in which he locates them. Much of the difference of opinion displayed among experts who have testified in "railroad cases" can be traced to the erroneous pathological assignment made by Erichsen. Those who have testified on behalf of the plaintiff have usually followed him, and called the case, if similar to those which he described, "spinal meningitis" or "myelitis"; while those appearing for the defendant have, true to their allegiance, correctly designated the malady as merely functional, but incorrectly and unscientifically attempted to magnify its harmlessness, and assigned to it a very trivial importance. This disorder, it is true, does not often terminate fatally; its course is slow and marked by temporary improvement and exacerbations, or even by intermissions, and in some cases is cured. But it is the average character of the illness with which the medical jurist has to deal. And as all cases of spinal irritation, particularly those due to concussion, agree in being annoying, painful, and disabling maladies, entailing a severe martyrdom of body and mind, these facts should be made the basis of every fair demand for and allowance of compensation.

As illustrating how far partisanship may carry a medical witness called as an expert in these cases, I may be permitted to cite a few lines from the testimony given *in re* John T. Harrold *v.* the New York Elevated Railroad Company:[1]

[1] Supreme Court, County of Kings:—John T. Harrold against the New York Elevated Railroad Company. Case on Appeal, 1880.

Q. Will you be kind enough to tell the jury what is known as spinal concussion, in your opinion?

A. That is a term; spinal concussion or railway spine, or nervous shock due to railroad accidents, which has become very fashionable in the last two or three years; it was first discovered by Mr. Erichsen, an English surgeon, and has been spoken of by several of the English authorities. I look upon it as a very dangerous term, because it opens the door to unprincipled persons, who make use of it, when there are no nervous symptoms, to prosecute corporations. . . .

It is remarkable that the dangers of such an answer to the defendants was not appreciated. There is no jury of average intelligence that could not detect the bias of the witness giving it, and who would not naturally judge from the methods to the justice of the cause in whose interest they were employed. But in this case it seems that the witness was put on the stand to argue the case, for the counsel calling him followed up the above cited with the following:

Q. Have you read Erichsen's work on nervous diseases?
A. I have, sir.
Q. What is your judgment about that book?
A. I think it is a very dangerous book.
Q. A dangerous book?
A. Yes, sir; because it perverts scientific truths.

If authorities are to be pronounced misleading and dangerous merely because they inculcate teachings which happen to support "the other side" in a litigation, we may as well abolish them all. What could be more absurd than to call for the criticism on eminent writers who, like Erichsen, have been cited by the highest authorities in Germany and France with confiding approval, by a professional expert whose own work has been made the basis of a suit for plagiarism. It so happens that too great eagerness of a witness is looked upon, whether justly or unjustly, with suspicion, and, I am happy to say that the disgusting relief into which a certain kind of hired testi-

mony has been brought in the course of railroad suts, occurring within the last few years, has done more to teach lawyers and physicians the dangers of such testimony than a hundred resolutions, homilies, and lectures on professional ethics could have done.

Erichsen, if the report is true that the list of suits in which he had been engaged as a medical witness, with the amount of the verdict secured in each case, was printed on a fly-leaf of his first edition, and subsequently suppressed, was certainly guilty of a lack of good sense and taste. But this does not at all detract from the scientific merits of his book. He has given too, as I have stated, the term spinal meningitis to what should more properly be called spinal or meningeal irritation. But the sufferings of the patient are the same, no matter by what name you call them, and of the reality of his cases there can be no doubt. Railroad corporations, neither in England nor in this country, are over-zealous to settle damage cases with large sums, unless they are well satisfied of the genuineness of the disease inflicted by their negligence, yet several of the cases described by Erichsen were settled in this way. Then again, physicians of as high standing as Reynolds, Messrs. Carden and Gamgee, and Sir William Ferguson, could not be gotten to lend the weight of their names to the support of chimeras, nor a master of pathology, like Lockhart Clarke, to manufacture artificial evidences of disease in the spinal cord of one of the cases on which Erichsen based his descriptions. Statements like those criticised should never be made by any physician, nor called out by any lawyer, unless specific proof of their correctness can be called for and given.

The most difficult element in these cases is the distinction of genuine disorder from simulation. As far as I can judge from the testimony given in a number of them, as to the existence of real or feigned disease, I should be in-

clined to believe that over one-half of those in which a verdict has been secured, including several in which very large sums have been obtained, were and are shams. One fine day, about three years ago, a physician called at my office, who claimed to have sustained severe injuries to his spinal cord by the fall of an elevator. I did not intend at the time to make an examination of him, for the situation was a new one; I had to sail between the Scylla of neglecting a colleague in alleged distress and the Charybdis of being suspected of co-partnership in a speculative action; so I sat listening and reflecting while he continued his history. I soon found that I had a man of low moral tone to deal with, a physician so ignorant that he did not recognize his ignorance, and had not even taken the trouble to read up the encyclopædias, whose perusal might have enabled him to manufacture more plausible symptoms than he showed; in short, I found that the injuries were entirely fictitious, and that not six cents, but six months in the penitentiary, would have been a proper recompense for this subject.

It is usually easy to make an absolute diagnosis between simulation and severe spinal irritation; it is sometimes impossible to demonstrate either the reality or the unreality of the milder forms of this disorder. But as the latter is not likely to be feigned by the simulator, who is rather apt to overdo matters, the cases in which the physician is at a loss must be very few indeed. A more serious element of uncertainty is due to the fact that a co-existing hysterical tendency in females or a hypochondriacal state in males may lead to the nursing and development of symptoms for which the mental condition of the patient is responsible, though that very mental state may date from, and be due to, the accident to which the unquestionably real and objective symptoms are attributed. Where a doubt arises as to the existence of such an element, the medical witness owes it to him-

self, his profession, and the cause of justice to call for the opportunity of giving a full and free explanation. It is none of his affair whether the jury will come to an erroneous conclusion; the turning-point in the decisions of such cases is not, in my experience, the impression made by the witness or its accentuation or perversion by opposing counsel in their summing up, but the charge of the court; and the medical witness is far safer in appealing to the intelligence and understanding of a judge than to the knowledge and logic of a jury.

A still greater problem might arise some day—I am not aware that it has arisen as yet in our courts—of detecting the swindling element in symptoms which, originally voluntary, finally become involuntary and real. This metamorphosis is an undoubted fact. Cases are on record where chorea, epilepsy, nay, even insanity, have been feigned, and where the simulator has been ultimately punished by the development of the real disease. Seeligmüller,[1] in the course of some remarks on the case of a railroad employé who demanded compensation for an injury, whose results consisted in lumbar pain and tremor of both lower limbs, these being exposed as shams, remarks that, in another case observed by himself and one described by Benedict, a simulated tremor became permanent and involuntary.

It is the facilities which are placed at the disposal of continental physicians, in the way of constant observation, that enable them to unravel frauds which, I fear, might impose on good men as realities under the unfavorable circumstances of most examinations made in connection with the cases I have referred to.

He who would decide between real and feigned disease requires far greater acumen, needs to be far better versed

[1] Ueber traumatischen Tremor und die Simulation desselben. Jahrb. f. Psychiatrie, iii., 1 and 2.

in medical literature, and to cultivate more accurate and searching habits of thought than he who practises in a field in which simulation is not likely to occur. His examination of suspicious, as of all cases, should be thorough, well-analyzed, and broad, and he should not fall into the error of assigning to the presence or absence of any one symptom the value of an absolute criterion. Thus, in one trial, in which, by the way, the issues were exceptionally tried in a scientific manner, and the witnesses on both sides, or the majority of them, were well-versed specialists of undoubted integrity, one of our foremost authorities, in going over the various districts of the spinal cord which, he believed, could not be affected by disease—the drift of the argumentation being that the spinal cord was therefore organically healthy—said that the crossed pyramidal tract could not be degenerated because spastic symptoms were absent. Since then, a number of post-mortem examinations have been made, proving that it may be grossly affected without causing such symptoms. An absurd error was committed in another trial. An author on nervous diseases testified that the plaintiff could not be suffering from paraplegia, because the heels of the shoes he wore were patched on the outside. It is a constitutional peculiarity of some persons to glory in the evolution of ideas which have nothing beyond their delicacy and intangibility to redeem them. Several witnesses were immediately placed on the stand who proved that the plaintiff had never used those shoes in walking, and had worn them but a few times up to the day of the examination, they having belonged to a relative. The fact had never been inquired into by the expert, and we can readily understand how the necessity of so doing should have escaped him, as, aided by a pocket battery, he had finished the examination of a case involving an issue of over thirty thousand dollars in from ten to

fifteen minutes, and had decided in that period of time that it was a case of simulation. It may have been simulation, but the methods resorted to do not prove anything but the fact that a biased witness is satisfied with the frailest evidence. I feel certain that the flimsy character of the proof of simulation offered led the jury to conclude that the theory of simulation was far-fetched. Their heavy verdict given afterwards is a significant commentary—the best I could select—on the statement I have previously made as to the necessity of a medical witness appearing unbiased. I have had the opportunity over and over again of seeing admissions made by a medical witness, frankly, against, or apparently against, the side which called on his services, do not injure his standing as a witness; on the contrary, an impartial attitude involuntarily calls for respect, though the momentary advantage which a suppression or distortion of facts might accomplish be lost thereby. A medical witness does not, like a lawyer, summing up for his side, speak for the present moment, but for all time. He is not the advocate of a party, but a representative of science; he should inflexibly adhere to the straight line of truth. A lawyer may defend one position in one case, and the very opposite in another, without, as far as I can learn, losing any prestige thereby. But when a medical witness forgets his allegiance to the exact truth for one moment, he may live in constant apprehension of the fact that he may testify in an entirely different way on other occasions, and be confronted with a condemnatory contradiction.

While it is true that fraud has undoubtedly accomplished its end in more than one litigation, it is equally true that subjects of serious spinal disease have lived, suffered, and died under the suspicion of being simulators, and that a post-mortem examination disproved the suspicion. A critic of Erichsen's work has said that all that an

indolent rascal, desirous of securing a moderate income, needs to do to accomplish his purpose is to read up Erichsen, train himself in the imitation of the symptoms related in that book, and then to go on riding around in railways until some fortunate collision occurs, whose results he may then know how to feign. I doubt whether any reasonable human being would ever seriously attempt to follow this suggestion. I should like to see the man heroic enough to court a danger whose limits he can never surmise for the sake of a doubtful verdict, with the attendant procrastination in its realization, due to the ponderous, majestic, and deliberate march of our trials in their progress through various appeals. There are significant warnings scattered throughout our record of railroad accidents which would deter the boldest speculator from participating in one of his own choice, even if it be not true that, as charged in connection with a terrible disaster which occurred some years ago, the railway authorities gave orders not to extricate the wounded passengers, but to let the train burn, inasmuch as by so doing many remains could never be identified, while a (for railroads) provident legislature had fixed the compensation for a death at a lower figure than surviving litigants would be likely to receive for broken legs, crushed arms, and concussed spines.

The following case[1] conveys a tragical lesson to those who are too ready to assume that a claimant of damages or disability from railway injury must necessarily be a simulator:

The patient, Joseph Hoffman, was aged about forty, of healthy family, and himself at all times vigorous and of sound physical constitution. On the second of March, he was on a train which had an accident near one of the

[1] Ein Fall von Rückenmarkserschütterung durch Eisenbahnunfall (Railway-Spine), von Dr. E. Leyden. Archiv f. Psychiatrie, viii., 1.

Alsatian forts (Bitsch). The patient was attending to the brakes of one of the wagons which was thrown from the track, and dragged about two hundred yards further by the engine after derailment. The patient experienced a severe shock to his back, and was knocked about considerably in the brakeman's box. He was also struck on the head in some way unknown to him. He fainted, and some time after awoke, crawled out of the wagon, and made his way with some difficulty to the next station. He felt considerable pain under his left shoulder, which was swollen, and in the small of the back. At this time he noticed no paralysis nor difficulty with bowels or bladder.

After treatment in the hospital for his external injuries, the patient noticed a weakness of his lower limbs, so great that he could hardly walk even short distances; at the same time, there developed belt-like pains about the abdomen. There were other pains of different character, which remained constantly throughout his illness, while the weakness of his legs disappeared. The pain and distress were so great that the patient was compelled to give up his position, and remain at home. The severe pain in the small of his back was increased by every movement, so that he could do no work, even within doors. In July, 1874, he was appointed superintendent of a gang of workmen at the building of a bridge, and was drenched through with rain. The following morning, he awoke with a stiff neck and pains in the cervical part of the spinal column, which radiated towards his arms and returned in paroxysms of two or three minutes' duration. After some local treatment, he improved sufficiently to consider himself capable of resuming his former position of brakeman, but was compelled to abandon it, on account of weakness of his left arm and the aforesaid pains in the small of his back. Various of the subjective signs of

spinal disease now appeared in rapid succession; the paretic weakness of his legs increased to complete paralysis; sensation was not destroyed; there was local pain over the third and fourth dorsal vertebræ, and the well-known authority on spinal diseases, Leyden, diagnosticated a tumor of the cord as the probable trouble, and attributed it to the railroad concussion. The electrical contractility of his leg muscles, which at first had been exaggerated, later disappeared almost altogether. He died from exhaustion following the development of bed-sores, diarrhœa, and obstinate vomiting, on the fourth of April, 1876, his sufferings having lasted three years. The railroad physicians had repeatedly questioned the existence of an organic affection of the cord; the poor sufferer was repeatedly denounced as a simulator, subjected to repeated examinations, and even after his death the railroad officials and their medical agents with great reluctance admitted the justness of the claims of his family. I herewith exhibit to you a plate showing the appearance of Hoffmann's spinal cord. A so-called perimeningeal neoplasm was found, consisting of a cheesy mass which united the outer membrane of the cord, the dura mater, to the vertebral column. This new formation was regarded as the result of a chronic inflammation; it was 190 millimetres in length, and perforated the dura at a point corresponding to the exit of the sixth dorsal nerve pair. Signs of inflammation of the cord itself were found, these being evidently of a secondary occurrence.

This case is significant because objective signs of spinal disease were not demonstrable at the time the patient was regarded as a simulator.

The field of spinal injuries is, as you see, a wide one, and it would be futile to attempt anything like an exhaustive discussion of the topics involved. If I have even remotely suggested anything worthy of discussion and elaboration

by the Society, I shall feel that the object of this paper has been fully accomplished. To further the ends of such a discussion, I will venture to formulate a few propositions, touching this subject.

1. Spinal injuries, entailing as they do unparalleled suffering and disability, are pre-eminently proper grounds for a claim for compensation at the hands of those who, through negligence, are responsible for their occurrence.

2. Inasmuch as the previous existence of a neurotic state, such as hysteria and hypochondriasis, may be responsible for many disease phenomena ensuing after railway and other shocks, allowance must be made in favor of the defendant to such extent as it can be reasonably inferred that he is not responsible for the plaintiff's disorder. The same presumption and allowance should be made in case the plaintiff is shown to have suffered from syphilis or any other affections, such as certain pelvic disorders in females which predispose to the development of spinal disease.

3. It is an interesting question whether the burden of proof as to the existence or non-existence of previous disease which may mitigate damages should lie with the plaintiff or with the defendant.

4. The presumption in the case of a litigant asserting the existence of disease of the spinal cord is that he is really a sufferer. The question of simulation should always be raised where the direct proof of an alleged disorder is not satisfactory; but the burden of such proof should rest with the defendant; and every litigant in such cases should be considered a sick man till he is proven to be a sham.

5. Every attendant circumstance of an accident or of violence, leading to alleged spinal injury, should be made a part of the trial record. I find it difficult to understand, from a medical point of view, what the philosophy of the

ruling of an eminent judge in the Harrold case was, when he ruled out as inadmissible, evidence relating to the rapidity of the train before the collision.

6. The sooner corporations show an inclination to admit the claims of honest claimants for compensation, and to contest complaints on their merits, in short to limit themselves to methods which do not smack of chicanery, the sooner will the public, the press, courts, and juries be able to recognize and willing to condemn improper claims, and to brand and to prosecute those who endeavor to coin capital out of the misfortunes of others by the fraudulent pretense of spinal disease.

Mr. Avery opened the discussion as follows:

Mr. President: I do not wish to open the discussion of this interesting paper. Some one should. Uncertainty is the legitimate basis of litigation. A respectable lawyer may properly argue or try either side in a case of doubt. The law or the facts are not known until after trial, and future decisions may determine the immediate one was wrong.

The paper demonstrates that spinal injuries are a legitimate basis for litigation, for it leaves us all in a fog about them. One word as to a thought suggested. The Supreme Being, without question, in the creation of man knew he would be as active and ingenious as he has been, and invent as many means for destruction as he has done, and gave him an organization best fitted for all the purposes and activities of human life, even for whirling along at lightning speed in a railroad train. There is no occasion for a new race with a different organization, so the Maker don't get up a nineteenth century race.

To return to the practical subject: a serious spinal injury sometimes happens from a slight cause. A slight blow on the neck produced the death of one person; the statement was, it dislocated the neck at the junction of the axis and atlas. Near forty years ago, a shrewd, bad man succeeded, through mere pretence of a spinal injury, in escaping detection of a serious crime. In fact, this pretence was his capital in crime. I found it out by defending him at the end of his career. He told me the tricks and mistakes of his life. He was not guilty of the crime charged against him when I defended him. Fortunately for him, he was never

arrested when guilty. He, however, then swung himself on crutches at court and on the street ; at home he was unlame. He practised his deception upon receiving a slight hurt in the back or in giving it the appearance of an injury, took to his bed, called in the doctors to examine into his condition. He made them believe that he was nearly paralyzed, and must remain in bed a long time. That night he went about twenty miles and stole a large sum of money, and was visited the next day by the physicians and pronounced no better. This was a case of successful shamming. From the paper, such tricks can still be as successfully played.

About fifty years ago, there was an interesting case of which I have some knowledge; it attracted a deal of attention in the section where it happened. This was a real one. A youth by the name of York was playing leap-frog, and was bent over with his spine turned up, when a large fellow ran, placed his hands on his back, lifted himself up the length of his arms, and came down upon York with all his force and weight, crushing him to the ground. In common parlance it was said his back was broke; several surgeons and physicians called to see him and consult about it. Some thought he could not live beyond three weeks ; others that he might live for years, but would never have the use of his lower limbs. One said that with care and proper treatment, he would recover completely, and be more intellectual than if he had not been injured. He finally recovered with a fine intellect, and lived a useful, active life. His recovery was slow, but perfect. The surgeons, I believe, disagreed about locating the injury; one determined it was at a point to so injure the spinal cord as to cause a separation. Enough they did not agree, of course. Only one reasoned or guessed right. Each one had a reputation to be affected. Time or an autopsy always settles the questions of difference. It seems that doctors are as liable to disagree to-day as fifty years ago, where reputations are at stake, as well as where pecuniary interest is a bias. As to advantages: items of damages are very uncertain as greatly as to what the amount should be. Many circumstances must be taken into consideration. I feel like suggesting one—as a query. A person rides a thousand miles at a rapid rate continuously ; finally an accident happens, and he or she has been injured in the back. Has not the ride predisposed to injury? Should there be any damages? If any, should the ride be taken into consideration for the purpose of lessening the amount? The settlement of this query would determine the question of the admission or rejection of the evidence as to the speed of the train

before the accident. I never take these long rides but I feel pain in my back. The particles of my body are ready to separate easily.

Litigations for spinal injuries should not be discouraged, as all are becoming wiser from them, and the usual defendants are able to defend or pay damages.

I desire to stimulate the reader to make further investigation of the human brain. He is an expert in respect to it and its action. The man is there; all the rest of the human system is but for its support. Life and thought are yet to be found out. Is there not an element or force acting that has not, and yet may be developed? If electricity is or produces the sentient force, cannot its action be developed, and this means having the action always healthy?

Mr. Benn: I have in mind a case where a large judgment was given against a company in which the physicians testified that the plaintiff could not recover. The jury, in their sympathy, evidently thought to better let the man have the verdict. But soon after he went about, and engaged in active service. Now, it is hard to think that the doctors could have sworn to what they did not believe; and yet, with all the differences of opinion, we have to rely upon their uncertain evidence. There are a good many things well said in this paper. There was one statement, I think, which we will all recognize as referring to a disaster in Ohio, which cannot be better paralleled than by one of Artemus Ward's stories: While on the Cleveland journey, he liked to sit with the driver and talk, and finding that their road went along a precipice, asked if accidents were not frequent. The reply being affirmative, he asked further: "Does that not cost your company a good deal?" The reply was: "Yes, it used to, because the jury were always agin' us, but them things don't happen no more." Artemas then asked how this could be, and the driver closed the conversation by informing him that dead men could not sue, and that when an accident happened nowadays and the passenger was not killed outright, the driver "finished" him.

Dr. C. S. Wood: I cannot add anything beyond some illustrative cases, as I did not arrive in time to hear all the propositions advanced in the paper. It was an impression among the profession twenty-five years ago that few patients recovered from the effects of spinal injury, but that is not the opinion of the present day. It is almost impossible to detect simulation in some cases, and even in case of such injury supposed to be followed by organic changes, it is not impossible that they may pass away.

There was a case of a man who was injured in a railway car, and immediately showed symptoms, lay in bed for months, and began a suit. The doctors advised the company to settle, which they did, to the tune of five thousand dollars. Three days afterwards, the patient was about the street. I believe that this patient really believed that he had received a serious injury at the time. It is very difficult to prophesy as to the prospects of a patient with spinal shock. I recollect, in the instance of a railway disaster at Binghamton, to which place I was called with other physicians, that among the numerous wounded who filled the houses of the place, there were a couple on their way to Michigan who presented nothing but shock. I advised them to settle with the company. Of the two, the gentleman, who had appeared the most injured, recovered, and is still in full enjoyment of health, while his wife, who could walk about after the accident, never recovered.

During the war, a number of cases of spinal concussion occurred to soldiers in railway trains. I have had the curiosity to follow up these cases, and, as far as I could learn, they all recovered. If these accidents had occurred in civil life, the injured would undoubtedly have sued for, and in many cases obtained damages.

Dr. M. A. Henry: I did not have the pleasure of hearing the entire paper, but the conclusions seemed to me to be very practical, and were interesting to me, as I think they must be to lawyers. One element, I think, should constitute a strong point in judging of these cases, namely, the existence or non-existence of a predisposition. Persons predisposed to injury of the spine from slight shock, might be predisposed equally to locomotor ataxia from causes which would not produce the same result in other persons. This ought to be taken into consideration. A number of persons there are who, without any bad intentions, are induced to bring suits by the influence of lawyers, and experts on nervous diseases should be on the look-out to detect any animus which prompts lawyers to undertake suits of the character spoken of to-night. If a good set of experts were to assist lawyers of honest intentions, claimants would not get unmerited damages.

Mr. Eller reiterated the views as to the appointment of government experts advanced at a previous meeting.

Colonel Moulton: Expert testimony does a good deal to clear up, as well as to mislead. It seems often that they make the mistake of attempting to reason inductively on too narrow a basis. I remember a case in which there was great rivalry between

physicians in a malpractice case. A lady had died, and the physician, a homœopath, was sued. Some of the most eminent physicians testified, on behalf of the plaintiff, on a hypothetical case, as to how she should have been treated, et cetera; only one witness disagreed, and that was a woman, who happened, as it turned out, to have been correct. I do not believe in government experts, I believe in a healthy rivalry under the present system, by which the best witnesses are bound to be selected. The chief stimulus of honest scientific investigation is a combination of the love of their science and of fame. This will produce more capable and honest witnesses than any government or judicial appointment.

Dr. Spitzka closed the discussion, indorsing the views on expert testimony advanced by the previous speaker.

The thanks of the Society were, by motion, tendered to Dr. Spitzka for his able paper.

New and unfinished business next engaged the Society's attention. It was moved, seconded, and carried that the thanks of the society be given to Mr. Eller for his services in connection with obtaining the copy of the "Act of the State of Pennsylvania, Relative to the Supervision and Control of Hospitals or Houses in which the Insane are Placed for Treatment or Detention, Approved the Eighth Day of May, 1883;" and it was further moved, seconded, and carried that a committee of three be appointed by the chair to take into consideration the subject of this act, and report to the Society thereupon. The chair then appointed Dr. Spitzka, Judge Hull, and Dr. Wood as such committee.

A motion was then made by the President of the Board of Trustees, authorizing the Treasurer of the Society to pay $1.50 more to the *Evening Post*, being balance due for printing of by-laws. Seconded and carried.

A resolution was then offered by Mr. Eller, authorizing the dropping of delinquents from the roll by the Trustees. This gave rise to some discussion and resulted in the offering of an amendment by Dr. Jacobus to refer the matter to the Secretary and Finance Secretary to act, with power. Dr. Spitzka having moved to table the whole matter, Mr. Eller, at his own request, was allowed to withdraw the resolution, whereupon Dr. Spizka's motion prevailed.

The Society then, on motion. adjourned.

REVIEW DEPARTMENT.

INJURIES OF THE SPINE AND SPINAL CORD Without Apparent Mechanical Lesion, and Nervous Shock, in their Surgical and Medico-Legal Aspects. By HERBERT W. PAGE, M.A., M.C. Cantab., etc. London: J. & A. Churchill, 1883.

If all branches of medicine were subjected to the scorching sunlight of medico-legal questioning, it would conduce eminently to the increase of precision of thought, observation, and expression. It is too much the fashion to deprecate the hauling of medical questions before judges and juries of laymen. It is too much the fashion for physicians to evade the witness-stand, and shirk this important duty of a citizen. It is too much the fashion to sneer at those who have the fitness to hold their own with a lawyer, and who have also the moral courage and the honesty—for, in the fierce forensic clash of contending interests, the honesty needs a large support of moral courage—to ascertain the truth, and maintain it in the face of searching, often unscrupulous cross-examinations, professional prejudice, and, too frequently, a hostile public opinion. It is too much the fashion to overlook the fact that an honest and competent medical witness is more deserving of honor than an honest and competent judge; for it is only in exceptional cases that it is to the judge's interest to be corrupt, and his opinion, good or bad, is received with the respect bred of fear and tradition, whilst the medical witness is tempted at every step, and against his opinion, though it might embody more learning, experience, and common sense than are usually concerned in the election of a dozen judges, are pitted his age, his religious opinions, the amount of his fee, and all the seeming contradictions with which an advocate, apt in setting springes to catch wood-cocks, may confuse a jury. We think, therefore, that the author who can write such a book as Dr. Page has written should receive the applause due to an effort of more than ordinary value, the more especially when, as he expresses it, his

object is "to bring before the profession the results of my observation and experience, in the hope that I may, to some extent, succeed in throwing light upon much that is obscure, and in helping others to a clearer, and, I would fain trust, a more correct view than has hitherto been afforded of the injuries, and the consequences of the injuries, received in railway collisions."

As Dr. Page has been surgeon to the London and North Western Railway Company for nine years, the experience to which he alludes must have been no mean one. But in this description of his object in writing the book, the author's modesty does him injustice, for he does not mention that the great merit of the book is the virile analysis of the slip-shod statements and conclusions of his predecessors in this line of subject, and particularly of Erichsen's curious mixture of twaddle and sense on the so-called "Railway Spine." To certain chapters of the book, forming a dissertation upon "Injuries of the Back, Without Apparent Mechanical Lesion, in their Surgical and Medico-Legal Aspects," was awarded the Boylston prize for 1881; and it was well deserved.

Dr. Page strikes out boldly at the outset. He questions the propriety of applying the term "concussion" to the spinal cord in the same manner in which we apply it to the brain, and this for a number of reasons. In the first place, the spinal cord is far more adequately protected against injury than the brain. It has its surrounding fat; its pia mater is more robust in consistence than is its cerebral analogue; its wall of vertebræ is heavier and less likely to be affected by traumata than the skull, and, as he might well have added, the cord is smaller and more deeply-seated than the cerebrum. In regard to the protection afforded by the ligamentum denticulatum and the subarachnoid space around the cord, upon both of which our author lays great stress, we do not deem them of as much efficiency to the cord as are the subarachnoid space, the ventricles, and the falx to the brain. In the second place, Dr. Page calls many discrepancies to view when he proposes to divide cases of concussion of the brain into three classes, and compares with them the so-called cases of "spinal concussion." At this point, we may profitably follow him into division, as follows:

"A. Cases of 'concussion' where the symptoms of concussion are essentially transient, momentary only, or lasting for a few minutes, and are mainly due to the sudden 'shock' induced by shake of the whole brain-mass by a blow upon the head." He has been unable to find a case of a similar concussion which

would bear close analysis, although Dr. Wilks, whom he cites, claims that he has seen them.

"B. Cases where the early symptoms of 'concussion' proper are of longer duration, and the later—pain, irritability, etc.—are slow to pass away, and where there may not be, although undoubtedly there very often are, definite structural lesions of the brain substance at a point remote it may be from the part struck, lesions by *contre coup*, which of themselves may give rise to no symptoms." He analyzes a number of spinal cases of this variety, and makes it plain that in all of them there is reason to believe that the symptoms may have been due to fractures, extravasations of blood, etc., rather than to simple concussions.

"C. Cases rapidly fatal, with concussion symptoms, or fatal at a later time after the symptoms of concussion have materially subsided." He has been unable to discover cases of this kind among the spinal concussions, inasmuch as the symptoms have been those of grave general shock, rather than of local shock or concussion.

He then passes on to a discussion of the many confusing elements that may make a diagnosis difficult, nay, almost impossible, in cases of railway injury. A man, for instance, is in a collision, is shaken up, a little dazed perhaps, and the next day complains of pain in the back. Forthwith enters the physician learned in medicine—but not in neurology. A collision, partial loss of consciousness, pain in the back that is not only felt by the patient, but is evidenced by the facial expression when he moves or is touched. "Ah! yes," thinks our learned physician, "spinal concussion, shock to the nervous system." And it never occurs to him that the pain may be purely muscular, nor does he know that it is extremely rare for spinal disease to be evidenced by such pain as this in the back; and the patient, who has only been shaken up and bruised, is made out to suffer from myelitis, takes to bed, employs a lawyer—or has been taken in hand by some legal firm who send out their "runners" after each accident—brings suit for a large sum against the railway company, goes before the jury on crutches or a stretcher, and obtains a verdict under false pretences. Or, as in the following case, a woman is in a collision. "She is a widow, aged thirty-eight, the strong and healthy mother of seven children. There was no history of her having been much hurt at the time, but within a few hours she began to have a pain, or a sensation which she described as 'opening and shutting' in the small of the back. The next morning she continued her journey of nearly two hundred miles, and finding that in a few days

the pain in her back was a good deal worse, she went to a hospital. She was an in-patient in the hospital for six weeks, during the first three of which she was in bed, suffering from pain and stiffness in the small of the back and from general weakness. For three weeks she was up and moving about the wards, and she then made a journey of 330 miles in order to take one of her children to school. This business over, she then travelled two hundred miles more home, in fact to the place where the accident had originally happened. This was exactly two months after the accident, and as soon as she got home she at once took to her bed, suffering from great pain in the back, from much hyperæsthesia in the dorsal and lumbar regions, and from general prostration. She remained almost entirely in bed until about fifteen weeks after the collision, when it was accidentally discovered that she had lost all motion and sensation in the legs. She had complete control over both bowel and bladder, and there was neither wasting of the legs nor bed-sores. The paralysis of motion and sensation seemed absolute. 'The woman was at the same time exceedingly 'hysterical,' complained fearfully of pain in the back and of innumerable queer sensations in different parts of the body. The opinion was given that this paraplegia was not dependent upon organic disease; that it was real, not feigned; and that although there was every prospect of her recovery, it was quite impossible to say how long she might suffer from the paralysis, or how soon she might be well. She was attended throughout this illness by a trustworthy nurse, and there was never any suspicion that the woman was wilfully maintaining her condition. No material change was found in her condition up to six months after the accident, when her claim, naturally a considerable one in the circumstances, was settled. Within a fortnight she left the house where she had been staying, and in three months she was walking about without assistance in perfect health, a second husband having already secured her hand and her fortune. Further account of her cannot be obtained."

Dr. Page thinks that this patient was not a malingerer. "There can be no doubt," he says, "that the woman received a sprain of her vertebral column, and that she had some 'shock,' but of greater moment in the history of the case is the fact that the long and fatiguing journeys which she took within a short time of the accident must have been largely instrumental, not only in preventing complete recovery from the early prostration, but even in increasing the general weakness from which she suffered. After the first journey she was compelled to go to a hospital, and after

the second and longer journey she was so much exhausted that she had at once to take to her bed."

Perhaps Dr. Page is right; but it looks to us, we sadly confess, as if, to use a slang but expressive phrase that hails from the Golden Gate, the railroad company had been "played upon." It is not mentioned what the tests were that determined the paralysis of motion and sensation to be absolute. It was certainly an extraordinarily sudden onset to occur two months after the accident. A traumatic paraplegia of motion and sensation without coincident vesical and rectal implication is certainly, while not impossible, yet unusual. The patient is admitted to have been "hysterical." She got well in indecent haste after having her claim settled, and thriftily provided herself with a second father to the seven children within three months. And so, take it all in all, we fear that she was more thrifty and energetic than strictly good, and we can imagine her, the seven children by the first husband, the second husband, and the children that have come by him, all cheerfully smiling at Dr. Page's guileless trust in the founder of their family and their fortunes. But the case illustrates, precisely because of this difference of opinion between us and Dr. Page, the way in which earnest men will arrive at different diagnoses in regard to the same patient.

The seventh chapter is upon the subject of malingering, and no wayfarer in the medico-legal witness-stands could waste time in reading it. Dr. Page has, at times, a happy faculty of saying strong things in strong phrase, and of this peculiarity this chapter affords some good examples; as when he writes:

"Depend upon it, if a man has not known disease at the bedside, if from want of familiarity with disease he cannot rightly weigh and balance its different symptoms and signs, he will be almost certainly deceived when a case of fictitious disease comes before him. An apt though simple illustration of the risk of deception may be taken from the attitude and position of joints in real and assumed disease. He must be more expert than are most malingerers who can make his knee-joint, for instance, show the ordinary symptoms of veritable disease of synovial membrane, cartilage, or bone. Let us put aside the physical signs—heat, swelling, and the like, which may be absent—and glance only at the position of the limb. 'Permit me,' writes Mr. Hilton, in his lectures on 'Rest and Pain,' 'to refer to this constantly flexed state of an inflamed joint: take, for example, that of the hip; I venture to say that no gentleman here ever saw an inflamed hip-joint with the leg extended. . . . In the case of the knee-joint, when inflamed,

it is always flexed. Curiously enough, the malingerer, wishing to deceive and to impose, almost always endeavors to indicate his long-continued and extreme suffering by fully extending the leg. But this extended position displays the imposition.' "

The book has an appendix, containing tables of 234 medico-legal cases, which will doubtless prove of extreme value for purposes of reference.

TYPES OF INSANITY: AN ILLUSTRATED GUIDE IN THE PHYSICAL DIAGNOSIS OF MENTAL DISEASE, by ALLAN MCLANE HAMILTON, M.D. New York: William Wood & Co., 1883.

This book consists of ten plates and thirty-six pages of text, and it is difficult to say which deserves most admiration, the boldness of the publishers who venture to offer the former as artistic work, or that of the author in writing such a text as the latter. To illustrate the general character of this performance, we need but cite a single passage: "After all we are to look for atypical crania, which are either disproportionate in size, or present facial angles *so great* as to suggest an at once *small and undeveloped brain*" (page 6; italics ours). We take it that Dr. Hamilton has been stimulated to undertake craniological studies in the insane, of which we find no traces in his earlier writings and testimony in court, by the revelations of the Guiteau trial and autopsy. It will be recollected that the learned doctor and one of his associates among the Government experts, the same who accomplished the marvellous feat of making one hundred and forty-five autopsies on less than fifty subjects, had both taken measurements of Guiteau's head, to prove that it was not unsymmetrical, as previously claimed by another witness. Unfortunately, the two tracings taken by the learned Government witnesses differed as much as any two things can well differ in nature. The necessity of being accurate in making measurements has, therefore, been brought home rather forcibly to the mind of the author before us, and he undoubtedly deserves credit for his honest efforts to reach the truth. It is only to be regretted that he should have gone about his work so superficially and hastily as to get the facial angle upside down, to believe that the hatter's *conformateur* is an instrument of scientific precision, and to advise measuring "as nearly as possible" the capacity of the cranium in living subjects. We have sometimes had occasion to measure the cranial capacity in living subjects—authors for example—but we never pretended to do this in any other than a figurative sense, and regret that Dr. Hamilton

has missed his opportunity of instructing an anxious profession as to the methods of doing this mathematically or approximately for the alienist's purposes. There may, however, be, after all, but little reason to mourn over Dr. Hamilton's lost art, especially if its diagnostic indications relating to insanity were as peculiar conceptions in his mind as those which he had of the facial angle. The Caucasian has a greater facial angle than the negro, the negro than the orang outang, the orang than the dog, and the dog than the alligator. Applying Dr. Hamilton's criterion (*vide supra*) the Caucasian consequently has a smaller brain than the negro, the negro a less developed brain than the ape, and the ape an at once smaller and more undeveloped brain than the puppy, for the smaller facial angle is found with the latter! But those who can measure the cranial capacity of authors will not be surprised at the conclusion that "facial angles so great" indicate an "at once small and undeveloped brain," as the *large* facial angles of Humboldt, Isaac Newton, Goethe, Daniel Webster, Cromwell, and Napoleon *premier* conclusively prove, of course!

Leaving for one moment the text, let us turn to the "types" illustrated in the accompanying plates. Most of the subjects—in fact all but three—are old acquaintances, for are they not inmates of the show wards of the Ward's Island Asylum? Are they not exhibited before the Visiting Committee of the Lotos Club, and taught to go through performances, *alien* in their character to their insanity, but necessary to invest them with interest in the eyes of the laity? There is, on Plate I., John Rouse, of Randall's Island, a microcephalous idiot, although Dr. Hamilton does not seem to realize to which variety of idiocy he belongs, and either fails to get the cranial measurements right, or must have discovered that Rouse's head has grown since we measured it. Here was an opportunity for Dr. Hamilton to measure what he conceives to be cranial capacity, of which he has failed to avail himself, but of which no reasonable being will attempt to avail himself till the saw is applied, and the thickness of John Rouse's skull is known. The statements made by Dr. Hamilton about John Rouse's intelligence are insufficient. John Rouse, although his head is no larger than that of a Macacus, although any large man could include his cranium in his hand, though he has no forehead, is more microcephalic than the microcephali of Vogt, and the terrible and monstrous atrophy of the casement of the intellectual organ is so extreme that the entire facial skull has shared in the arrest of growth, is unquestionably a simulator to some extent. He is frequently trotted out before spectators, made to indulge in a sort of

sailor's double-shuffle dance, which, it must be owned, he gets through with fairly well, can call out three cheers, and make the accompanying gestures, though he be stone blind, and occasionally has sufficient appreciation of his situation to get sick of the "show," and then endeavors to shirk it. He knowing that it would be improper for him to perform certain excretory functions in public, then turns around to the attendant, rubs his belly, and exclaims a few sounds resembling "oh, me sick here," and is led off, on which, knowing that his persecution is over, he recovers his health as if by magic. But we can readily understand why, even if this feature of John Rouse's case had been known to Dr. Hamilton, he should fail to accentuate it. There is a certain record at Washington, of testimony given by Dr. Hamilton's allies, a perusal of which will render Dr. Hamilton's reasons as clear as they may be in his own mind—we hope! As to the picture of John Rouse, it is altogether inadequate, and fails to present the real features of this remarkable *microcephale*. The second plate, that representing an imbecile, is an excellent one. The patient is recognizable on the first glance, and is really a characteristic case, which cannot be alleged of most of the author's "types." For example, it is difficult to detect anything in Plate III. except the lack of knowledge of perspective on the artist's part, and bad execution on the part of the engraver. It is intended to represent melancholia attonita. We think that Dr. Hamilton, who takes good care to inform us that he is "one of the consulting physicians to the asylum of New York City," could have furnished us with a better illustrative case of this disorder, namely, that of Mary Ann Mullen, an inmate of one of these asylums, who perished on the altar of oophorectomy,[1] under the hands of one of the consulting staff, and in the presence of other members of that august body. Plate VI. represents one of those wretches who are periodically taken down to the so-called clinics of the Podunk University, taught new tricks every year, and trotted out for the delight of raw medical students, ward politicians, club capons, and the ladies of the "Flower and Fruit Mission." The features of the patient as such are recognizable, those characterizing his insanity are lamentably absent. Plate VII. is, at least so we thought at first, a capital topographical elevation of Mont Blanc, with its glaciers, Pic d'Aiguille and Pic du Midi, as well as the *crevasses* and moraines. On reading the accompanying explanation, we felt as cheap as the lady who, admiring some *decalcomanie* of her daughters, said, "Why, it's

[1] Her ovaries were (both of them) absolutely healthy.

beautiful; it is either a cow or a rose, but I can't tell just which!" for the "Pics" turned out to be intended for the frozen saliva, the moraines, the naso-labial folds, and the *crevasses* the eyes of a woman alleged to be suffering from dementia.

One would have supposed that, with over two hundred paretics to select from, Dr. Hamilton might have found one better illustrating "General Paresis" (paretic dementia) than the one figured in Plate IX., who shows, whether by virtue of an individual peculiarity, an error in diagnosis, or carelessness on the artist's part, nothing positively characterizing that disease. Dr. Hamilton, or rather his artist, in his ten plates, lets us down very gently from the sublime to the ridiculous. The last "plate" is simply a monument of the outrageous in illustrative art; we were quite lost in this maze of blotches, which seemed to represent putrid saddlerocks, tainted blue-points, and other varieties of decayed bivalves and crustaceans, until we detected a text reference which proved that they were intended to depict othæmatomata and defective dentition. Without going into details, we will recommend the purchase of the "types" to those who may feel inclined to suspect us of exaggeration. In reality, language is scarcely adequate to dealing justly with the true merits of the production of Dr. Hamilton's artist, just as it would take about three times the amount of Dr. Hamilton's text-pages to point out all the errors, omissions, and imperfections in them.

Mr. Corkhill's experts, who appeared to be unanimously of the opinion that there "is no such term as moral insanity in science,' must feel painfully surprised to find that one of their number, Dr. Hamilton, describes "varieties of *moral insanity* of sexual outgrowth in young people of both sexes." But this is not the only evidence that the author of "Types of Insanity" gives of—well, let the reader call it what he will; we are not criticising persons.

Among the amusing features of the text is the description of the maniacal manner as "rigid and puppet-like." This is, indeed, a sample of the author's description throughout. On page 4, he has "misshapen but not atypical heads," and characterizes the movements of imbeciles as "quick and cat-like." Mr. Corkhill's experts, it will be recollected, decried the relation alleged by an opposing witness between cerebral malformation and deviation of the tongue, and Mr. Davidge waxed quite humorous over the fact that of five of these experts, only two could put their tongues out straight. Strangely enough, we find that Dr. Hamilton lays considerable stress on this symptom as an indica-

tion of imbecility, and there are other evidences in his short text showing that the great trial has had a beneficial effect on the doctor's psychiatry, and we have little doubt that he could have composed a much better chapter on the diagnosis of insanity if he had been left untrammelled by the assistance of another one of Mr. Corkhill's experts, a Dr. E. Macdonald, whose aid is mentioned in the preface. This physician has gained no little notoriety of late through his advocacy of an implied theory, that idiots are reversions to an equine, ovine, and similar ancestry, and we question whether it was under the influence of this teacher that Dr. Hamilton penned the following :[1] "So monkey-like is his behavior and motions that the diagnosis should never be difficult."

In connection with the description of "general paresis" (paretic dementia), he speaks of "local pareses which are features of the state of dementia." And the tendon reflex, which may be greatly exaggerated in this disease, is spoken of as being "normal or absent."

Dr. Hamilton leaves it to be erroneously inferred that he established a relation between the erect condition of the hair in the insane and states of violence, on page 14. This has long been known, and is mentioned by Darwin.

While, as we have said, Dr. Hamilton's latest production shows much advance on his own part in the appreciation and comprehension of insanity—for which appreciation and comprehension he seems to the reviewer to be, as previously stated, indebted to the Guiteau trial and a study of the text-books on insanity recently published in this country—we must say that, as a guide to the recognition of insanity by general practitioners and students it has no value whatever ; and, indeed, there are few general practitioners who would not be able to write a better and, at least, less misleading treatise on insanity themselves. To undertake a description of the clinical features of insanity as a whole, in the way the author does, is about as absurd a procedure as would be the attempt to give a uniform symptomatology of all liver disease without regard to the special forms of such disease.

That the author has not gone further into his subject will be regretted by all purchasers of "Types of Insanity." Still there is enough of the amusing in it, as it is, to repay any alienist for the outlay involved in its acquirement, though it is, of course, im-

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[1] Speaking of the idiot.

possible to say how much more comical a volume the doctor could have written if he had attempted to cover more ground.

The author of "Types of Insanity" appears to have a peculiar facility for getting things wrong, for contradicting himself, and has not gained in his appreciation of the practical application of the English language since writing or, rather, compiling, his book on nervous diseases.

EDITORIAL NOTES AND COMMENTS.

THE EYE-SYMPTOMS OF TABES.

(TO BE CONCLUDED.)

The paper of Dr. Schmeichler, published in the last number of the *Archives of Ophthalmology and Otology*, supplements very nicely the one contributed by Gowers on eye-symptoms in diseases of the spinal cord. While the latter author formulated the relation between eye-symp- most and spinal diseases in general, without adding anything essentially new, Dr. Schmeichler summarizes the observations of various authorities and numerous ones of his own, on the connection between eye-symptoms and that special form of spinal disease—posterior sclerosis—with which they are most constant and characteristic. His conclusions may be epitomized as follows:

1. Atrophy of the optic nerve is a frequent and early symptom of tabes. It is not found in its incipient stage in the advanced disease when ataxia is well-pronounced, although it may precede the full development of the spinal symptoms by years, and even attain a maximum development before ataxia occurs. Dr. Schmeichler finds that forty per cent of tabetic patients have optic nerve atrophy. This is much in excess of Erb's calculation, which yielded twelve per cent. He describes the appearances of the papilla and papillary vessels as follows:

"In the beginning of the process, when vision is but slightly diminished, no change is found aside from discoloration of the papilla. If the process has already reached a certain intensity,

and the visual power is considerably diminished, the vertical vessels are found intact, but sometimes the transverse vessels are found in fewer number. If the atrophy be already far advanced (from one to one and a half years, sometimes earlier, dating from the beginning of the trouble) one sees one or more veins—usually of the lower—wider than normal; one believes himself to be mistaken, but possibly, after four weeks, this vessel (or vessels) appears remarkably wide, and may after a longer or shorter period present twice the width of a normal vein. It must be accentuated here that these tabetics had no brain symptoms of any kind, so that, aside from the sharp contours of the papilla or its vessels —the dilated veins being also sharply outlined—the possibility of the appearances of the papillæ being the congestive results of a cerebral disorder must be altogether excluded. I saw the progress of vascular dilatation very distinctly. . . . After the entry of such a widened vessel into the retina, it remains dilated for some distance to gradually resume the ordinary calibre. After a duration of the optic nerve atrophy for years, the papilla is often found decreased as a whole, and the vessels narrower; but the morbid changes of the latter can be somewhat compared to those commonly following inflammation of the papilla. I have no experience whatever as to the manner in which the widened vessels again become narrow, nor, indeed, do I know whether they become narrower at all."

In another portion of his paper, the writer makes some patho-anatomical observations, which may be here quoted, as bearing on the conditions mentioned in the extract just quoted.

It is well known that with the atrophic process first the myelin and then the axis-cylinder degenerate (!) into connective-tissue fibrils; this, as I believe, explains why we find the papilla discolored even with almost undisturbed visual power, and that we never succeed in following up the gradual discoloration. *For as long as the axis-cylinder is intact, so long the visual power is not specially affected.* . . . This circumstance, which has been brought into relief in the case of the optic nerve by Charcot, and for the rest of the nervous system by Ribbert, explains why, as above stated, the visual power in multiple sclerosis remains stationary at a certain point, and does not altogether disappear as with tabes."

"With the atrophic process, the part of the optic nerve over the lamina cribrosa shrinks to a thin layer of fibrous tissue, as no

powerful connective-tissue frame-work can give the tissue support. The arteries, which may be compared to thick, hard-rubber tubes, remain quite unaffected by this process, while the veins, which at first perhaps remain unaffected, must gradually expand to fill the void left by the retracting connective tissue adjoining the adventitia. The veins act like a soft-rubber tube through which a fluid runs, and which is imbedded in a matrix. If the matrix around the rubber-vessel decreases, the vessel will be distended to fill out the resulting space, expanding to its utmost possible limits. That this dilatation of the veins only occurs after the process has lasted a certain time, and when the visual power is almost gone, is evident from the foregoing. The part of the optic nerve visible with the ophthalmoscope is composed, in its greatest portion, of axis-cylinders; these, being more resistant than the myelin, disappear much later than the latter; then visual power becomes entirely lost, and it becomes possible for the venous dilatation mentioned to occur. A similar relation is observed with the vascular sclerosis of the brain and spinal cord; they are at first, and for some further time, intact, as far as the microscope shows, with the exception that they are preternaturally wide; and we may add that this applies also to the eye, as far as the ophthalmoscope permits a conclusion. The vessels are probably, as Adamkiewicz states, the media of the sclerotic process, but with this they themselves remain nearly intact."

2. The acuteness of vision is not in direct proportion to the ophthalmoscopic findings, the eyes of patients which present the identical ophthalmoscopic appearances may differ grossly in their visual power. When the atrophic process has well set in, visual acuteness sinks rapidly—within a few months—to a minimum, decreasing till only quantitative perception remains, and ordinarily remains stationary at this point, complete amaurosis being rare. The loss of visual acuteness in tabes differs from that found with multiple sclerosis, in the respect that it rarely sinks as low in the latter affection as in the former, and when a stand-still is reached, this is of longer duration with the disseminated process.

3. The field of vision in tabes, when affected, is affected by *concentric* limitation. This is the characteristic form of

field limitation in this disease; while the "sector-like" defect, or partial limitation is found with multiple sclerosis.

4. Color blindness, or more properly speaking, insensibility to color, is often an early feature of tabes, and sets in with concentric limitation of the smallest color-field, that for green; next that for red suffers, and finally only blue remains, the appreciation of which is limited to the region of the macula.

5. The subjective visual disturbances of tabetics are characteristic. The first symptom complained of is a fog. This cannot—our author believes—be considered an irritative phenomenon, as Samelsohn claims, and as we believed it to be, because a similar "fog" is complained of with congestive neuritis, with which atrophy has already begun to develop, and is also found in advanced atrophy when all signs of irritation have disappeared.

6. The disturbances of the pupil in tabes are: first, reflex iridoplegia; second, absolute iridoplegia; third, myosis, and fourth, inequality of the pupils. Dr. Schmeichler maintains that any one of these symptoms, when found justifies the physician in inquiring after the existence of tabes. Few neurologists would be willing to go so far. He has never seen bilateral mydriasis in the initial stage of tabes, but we have seen this condition even when the disease was pronounced, and independently of any extraordinary causation. The following terse description given of the characteristic pupillary states of tabes may prove of value to some of our readers:

"By reflex iridoplegia is understood the lack of pupillary reaction to light; with total iridoplegia the reaction of convergence is also absent (without the accommodation being affected). By spinal myoses is meant the narrow pupil found with disease of the spinal cord, and which shows the following characters: It either reacts to light or not (the latter being more frequent), under atropine it dilates to a medium width of 4–5 millimetres, and narrows very rapidly under pilocarpine; the following point is also charac-

teristic, which was thus far not known: the pupil dilated to medium width by atropine, requires a long time (frequently four to five weeks) to again become as narrow as it was before the application of the mydriatic. The inequality of the pupil is a very striking symptom, but is not as characteristic as the other disturbances, as—however rarely (?)—it also occurs with other individuals. Of all changes of the pupil, it is most frequent; the next in frequency is reflex iridoplegia. . . . "

7. Disturbances of the eye muscles may occur in the shape of paresis of one or several of them. Such paresis, if it occurs at all, appears as the very first symptom of tabes, or may even precede it by many years. It usually appears gradually, and after attaining a high grade, even amounting to strabismus, it may disappear altogether, to perhaps reappear after a longer or shorter interval. Such disturbances as the ocular pareses of tabes are found with no other form of spinal disease, but we cannot diagnosticate the existence of posterior spinal sclerosis unless there are other signs. For example, if the pupillary symptoms of tabes are present, we are compelled to at least suspect its existence, and if lancinating pains appear, the diagnosis of that disorder is to be made.

While, with the exception of the single point alluded to as a novel one, the paper adds little to our knowledge, it is a valuable resumé, and includes a suggestive physiological discussion, which we are unable to reproduce here, owing to its length, and exceedingly clumsy German.

AN ASYLUM CONFLAGRATION.

News of a terrible trgedy, involving the death of one of the leading English alienists, have just reached us in the shape of a detailed newspaper report. It appears that the private asylum of Dr. Boyd, well known through his researches on the morbid anatomy of the insane, was destroyed by fire, and that, besides two of the patients and a cook, Dr. Boyd and his son perished in an attempt to save

the other patients, or, as other accounts say, while trying to save valuable documents. The building of the asylum, which was situated at Southall Park, on the Great Western Railway, was in large part composed of inflammable material, and the flames consequently spread with great rapidity.

OBITUARY.

On April 30th, in his sixty-third year died Dr. Henry B. Wilbur, Superintendent of the New York State Idiot Asylum at Syracuse. He was the pioneer educator of idiots in this country, having established the first shool for them in his own house in 1848. Since 1854 he held the position in which he died. He was a prominent advocate of lunacy reform, and was repeatedly consulted by the Senate Committee on Asylum Abuses, with reference to asylum management. Most of our readers are undoubtedly familiar with his exposure of the deceptions practised with regard to the use of the Utica crib on a prominent foreign visitor at a leading State institution. He was also of great service in reforming the management of the Flatbush Asylum under its present superintendency, after the change which occurred about three years ago.

THE CRIMINAL INSANE.

Dr. Dewey, of the Kankakee asylum, in a discussion relating to the proper class of patients for whom it is desirable to provide asylum accommodation, considers that there are three classes whom it is desirable to exclude: the epileptics, criminals, and inebriates. These, he believes, should be provided for in separate institutions. By the criminals, Dr. Dewey means only those who are intrinsically criminals, not such as incidentally commit crimes as a con-

sequence of their insanity. The doctor believes that with these classes separated from the asylum population, the treatment of the insane might be greatly facilitated and the cost of future asylums greatly diminished. The deleterious influence of the insane criminal and the inebriates on the ordinary insane is unquestionable. The doctor makes some pertinent remarks on the insane which are in diametrical opposition to certain statements made at the Guiteau trial. "The question requiring most careful consideration, however, is with reference to the unconvicted criminal insane and insane criminals. Many of these are on the same plane with criminals, while others were of innocent and reputable lives prior to their insanity. Between these two classes are all possible combinations. Those who had been held to be the most abandoned criminals have often been found by a careful investigation to be insane and irresponsible. Monstrous crimes have been committed with malice prepense by undoubted lunatics. There are criminals who have inherited and grown up with such depraved and defective brains and minds that they cannot in equity be held entirely responsible. There are lunatics who know perfectly well the nature of a crime, who are able to distinguish the moral quality of an act and who are actuated by a criminal motive. There are lunatics wholly unconscious of their crimes. Other lunatics plan and execute their crime deliberately, methodically, and skilfully, alleging some fantastic reason in its justification. Insane persons are met with who feign insanity in some other form; finally there are asylum patients who know right well that they would enjoy immunity for any crime they might commit, because they had been pronounced insane, and who only lacked the opportunity to perpetrate any deed that malice or revenge might suggest."

CARMINE STAINING.

Obersteiner is entitled to the gratitude of all neurologists who, while interested in histological researches, are unable to devote much time to cosmetic experiments. He has made the simple suggestion of heating the staining fluid containing the specimens. Previously, when large sections were to be stained in neutral carmine, one great difficulty encountered had been the fact that specimens hardened for any length of time, however well they might ultimately stain, took the coloring matter up so slowly that many days and even weeks elapsed before the process was complete, and in the mean time the carmine usually precipitated, and the finest specimens were thus rendered valueless. In the laboratory of one of the editors it has been attempted to obviate this by daily changing the staining fluid,which can be done, if proper skill be employed, without injuring the sections. But even with this many failures occur. By subjecting the staining fluid containing the sections to a water bath heated by a spirit lamp, the finest staining can be accomplished in from one to two hours, and in the case of hæmatoxylin in even less time. The heating of hardened sections does not injure them in the least when the precaution is used of employing a water bath.

ANOTHER CASE OF INSANE INSPIRATION.

In some respects, the following case, cited from the current dailies, reminds one of that of Matthieu Louvat, who crucified himself, as well as of that of Freeman of Pocasset:

"Sylvester Knott, a well-to-do farmer, living in a comparatively isolated spot on the bank of Lake Erie, is the fanatic whose deeds are the theme of public conversation.

Some months ago he attended a meeting of the Salvation Army, at Franklin, where the first seeds of insanity were sown. For two weeks past he has wandered up and down the lake shore, regardless of sunshine or storm, declaiming on salvation schemes, picturing the horrors of judgment day, and calling upon sinners to worship God or be eternally lost. Yesterday morning he planted a large cross in the woods, upon which to nail his eight-year-old boy, believing the boy would be tormented in hell-fire forever unless he died the death of mankind's Redeemer. With strength well-nigh superhuman Knott held the lad firmly while driving a large nail through the little fellow's hand, unheeding his piteous pleas for mercy. The dreadful work was interrupted by some wood-cutters, who happened to be passing. Leaving his son hanging, the maniac fled, first striking down one of the rescuers with a hammer, then leaping into the lake. A search for his hiding-place proved fruitless, and it was thought he had been drowned, but such was not the case. Before midnight the insane man returned, smashed the door of his house, and knocked Mrs. Knott insensible at a single blow. Entering a chamber where his only daughter, Minnie, a beautiful girl of seventeen, lay sleeping, he bound her hand and foot and carried her to a lonely place in the forest, where hundreds of cords of wood were piled. An altar was quickly built, and upon it the madman secured his child."